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NPP Mission Data Format Control Book (MDFCB)

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NPP Mission Data Format Control Book (MDFCB)

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1.0 INTRODUCTION

1.1 SCOPE

This control book describes the data formats and contents of the National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) satellite mission data. Two wideband transmissions carry NPP mission data: the Stored Mission Data (SMD) and High-Rate Data (HRD). These transmissions are distinct from the narrowband data streams containing the satellite's housekeeping telemetry. Yet some narrowband content is present in the wideband transmissions. Descriptions in this control book are limited to data (at the packet level) unique to the wideband links. The Command and Telemetry (C&T) Handbook describes the narrowband content. In addition to providing information about the structure of the mission data, this document also describes the context of the data in terms of the scientific mission and the observatory of which it is a part. Thus, this document describes how and when each instrument outputs science, calibration, engineering, dwell and diagnostic data. Also included in the data unique to the wideband links are uploadable tables and memory These are dumped through the wideband links though loaded through the loads. narrowband links.

The document provides information to identify, distinguish and extract all of the X-band unique source packets from the satellite's mission data streams. This document will provide some information on conversion coefficients such as coefficients for converting counts to temperature, etc. The coefficient information provided is limited to the relatively static parameters need for ground processing that are not included as part of the X-band telemetry stream. It is outside the scope of this document to provide detailed information, such as calibration values, compression schemes, etc., required to interpret every data point inside the packets or to perform science data analyses. Instrument-specific documentation should be consulted for that information.

The X-band Data Format (DF) Interface Control Document (ICD) describes the top-level formats and data structures used by NPP. It is necessary for understanding the material covered here and has precedence over information presented in this document. For mission data, this document has precedence over all other related instrument documentation for the NPP program.

1.2 RESPONSIBILITY/CONFIGURATION MANAGEMENT PROCESS

During the NPP development and in-orbit checkout (IOC) phases, it is the responsibility of the National Aeronautical and Space Administration (NASA) to maintain the contents of this document. Because the packet content of both the SMD and HRD links are configurable on-orbit, the final release of this document will represent the satellite configuration at the time of the mission handover (launch plus 90 days).

This document will be maintained as a Class I document because its contents drive the design of the ground segments along with the X-band Data Format ICD. Information that will change frequently during the implementation and early orbit phases are maintained elsewhere as Class II document(s).

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

1.3 DOCUMENT ORGANIZATION

Section 1 is this introduction.

Section 2 lists the applicable documents and documents used as reference.

Section 3 describes the general characteristics of the Mission Data Systems. Provided is an overview of the mission data including processing, storage, and down linking of the data by the spacecraft. Also provided is a description of the spacecraft state, spacecraft modes, and instrument modes affecting the mission data streams.

Section 4 is the detailed description of the mission data formats for the five instruments: ATMS, CERES, CrIS, OMPS, and VIIRS. It also contains a section for selected data generated by the spacecraft.

Section 5 is a listing of acronyms and abbreviations used in this document.

1.4 DOCUMENT CONVENTIONS

The following general conventions are used in this document:

- Byte and word numbers are counted from the first byte transmitted and start with zero (0).
- Bit numbers start with zero (0), which designates the most significant bit (MSB), the left-most bit, and the first bit transmitted (per CCSDS standards).
- All numbers shown are in decimal unless otherwise noted.
 Obnnn or b'nn' = binary, Oxnnnn or x'nnnn' = hexadecimal.
- The term spacecraft refers to the spacecraft bus and its subsystems (e.g. C&DH, attitude determination and control, RF, thermal, propulsion, power)
- The term satellite refers to the spacecraft plus the instruments.
- Instruments output mission data in packets. Some of the Instrument reference documents use the term "RDR" whereas this document consistently uses "packet".
- Grouped packets contain mission data exceeding the size of a single CCSDS packet. Some Instrument reference documents use the term "segmented" whereas this document consistently uses "grouped".
- The Data Types listed in the packets' User Data Field tables have the following meaning:

| Abbreviation | Data Type |
|--------------|------------------|
| В | Bit Field |
| U | Unsigned Integer |
| S | Signed Integer |
| F | Floating Point |

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2.0 DOCUMENTS

2.1 APPLICABLE DOCUMENTS

- a. GSFC 429-04-02-28 NPP X-band Data Format Interface Control Document
- b. GSFC 429-03-02-26 NPP Spacecraft Stored Mission Data Interface Control Document to the Norway Ground Station
- c. GSFC 429-03-02-24 NPP Spacecraft High Rate Data Radio Frequency Interface Control Document to the Direct Broadcast Stations

2.2 REFERENCE DOCUMENTS

- a. NGST D35853 NPOESS Data Mapping APID, VCID, Downlink and Uplink
- b. NGES Report 12114 Advanced Technology Microwave Sounder (ATMS) Command List and Description, Rev E.
- c. NGES Report 12206, ATMS Instrument Functional Logic Diagrams, Rev B.
- d. NGES Report 12115 Advanced Technology Microwave Sounder (ATMS) Engineering Telemetry Description, Rev G.
- e. ITT 8196185 CrIS Command and Data Packet Dictionary, Rev H.
- f. BATC IN0092-115 OMPS Command & Telemetry Handbook, version 10.16.
- g. Raytheon/SBRS EDD154640-104 VIIRS Command, Telemetry, Science & Engineering Data Description, Rev K.
- h. 1553 Interface Requirements for NPOESS, D34470, 05/10/2005, Rev B.
- i. Operations Concept Description VIIRS, OCD 154640-101, Rev B.
- j. IN0092-132, On Orbit Operators Manual for the Ozone Mapping and Profiler Suite, Rev A.
- k. ATMS Instrument Operation and Maintenance Manual, Rev A.
- I. ITT 8208948 CrIS Flight Operations Manual: Rev B.
- m. Consultative Committee for Space Data Systems (CCSDS) Recommendations for Advanced Orbiting Systems Networks and Datalinks: Architectural Specification, 701.0-B-2
- n. FT1394 System Interface Requirements Document, D34471
- o. FT1394 S100 Technical Interface Requirements Document, D36381
- p. TM-04-161A, ATMS Memory Interface technical memo, Rev A.

- q. IN0092CCD-003B OMPS CCD Reference Figures.
- r. IN0092SYS-101 OMPS Limb Data Rate.
- s. IN0092SW-026A, OMPS Image Binning Algorithm.
- t. D47745, CERES FM5 Instrument Operations Manual, Rev -.
- u. CCSDS 121.0-B-1, Consultative Committee for Space Data Systems, Lossless Data Compression.
- v. 3257-SYS306 BATC System Engineering Report, NPP Test Packet Operations for Instrument Table Dumps
- w. IN0092-701, OMPS Flight Software (FSW) Users Manual, Rev G.
- x. IN0092-133, OMPS Post-Delivery and On-Orbit Maintenance Manual, Rev B.

2.3 OTHER RELATED DOCUMENTS

- a. NPP Spacecraft C&T Handbook, BATC 568423, Rev C
- b. GSFC 429-01-07-01 NPP Satellite Requirements Specification
- c. GSFC 429-01-02-10 NPP Interface Requirements Document, Space Segment (SS) and Command, Control and Communications (C3S) Segment

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

3.0 MISSION DATA SYSTEMS

3.1 MISSION DATA OVERVIEW

Mission data are collected from each of the five instruments:

- Visible Infrared Imaging Radiometer Suite (VIIRS)
- Ozone Mapping Profiling Suite (OMPS)
- Cross-track Infrared Sounder (CrIS)
- Advanced Technology Microwave Sounder (ATMS)
- Clouds and the Earth's Radiant Energy System (CERES)

These data, along with spacecraft housekeeping (HSK) data, are merged and provided to the ground on a real-time 15 Mbps downlink, called HRD direct broadcast. Instrument and HSK data are also provided to the Solid State Recorder (SSR) for onboard storage and playback as SMD.

The SMD are stored in the spacecraft's Solid State Recorder (SSR) and downlinked at 300 Mbps through playback of the SSR once per orbit over the NPOESS Svalsat ground station in Svalbard, Norway. The SMD stream contains:

- Science and calibration data from the NPP instruments;
- Diagnostic data from the NPP instruments when commanded;
- Engineering data from the instruments;
- Spacecraft attitude and ephemeris data, and
- Satellite housekeeping data (a superset of the stored state of health telemetry from the spacecraft and sensors containing higher-rate sampling of many measurements).

The HRD stream is similar to the SMD as it consists of instrument science, calibration and engineering data, but it does not contain data from instrument diagnostic activities. The HRD is constantly transmitted in real time by the spacecraft to distributed directbroadcast users. Output to the HRD transmitter is at a constant 15 Mbps rate. Fill data are added as needed to maintain that rate. The HRD stream is not stored separately on the spacecraft, but its content is a subset of the SMD stored on the SSR.

3.1.1 Spacecraft Processing of Mission Data

The spacecraft performs several processing functions of the NPP mission data:

- Provides a data collection/filtering/formatting/multiplexing operation;
- Provides CCSDS formatting for the Stored Mission Data;
- Provides CCSDS formatting for the High Rate Data.

The spacecraft collects the science and HSK data from the instruments and HSK, ephemeris, and attitude data from the spacecraft components. The data is then merged together to form the contents of the HRD and SMD. A filter capability is provided to selectively exclude data from either, or both channels. This data filtering capability provides the mission operations team a means of maintaining the 15 Mbps HRD rate in the event an operational mode exceeds this maximum rate while allowing higher rate data to be recorded as SMD. The spacecraft formats the SMD and HRD independently

due to the different interfaces with the separate transmitters. The X-band Data Format Interface Control Document describes the details of the formatting processes.

The filter capability mentioned above is achieved through satellite, user-configurable tables. These tables assign specific application process identifiers (APIDs) to a specific Virtual Channel (VC), and assign specific VC Identifiers (VCIDs) to the HRD, SMD or both mission data streams. Table 3.1.1 shows the current mapping of virtual channels to HRD and SMD. Table 3.1.2 then shows the mapping of APIDs to VCIDs.

| VCID | Downlink | Virtual Channel Content | Description | | |
|-------|-----------|-----------------------------|--|--|--|
| 0 | SMD & HRD | Satellite Housekeeping Data | Satellite HSK common to HRD & SMD | | |
| 1 | SMD & HRD | ATMS RDR Science/Cal/Eng | ATMS mission data common to HRD & SMD | | |
| 2 | SMD | ATMS RDR Science/Cal/Eng | ATMS mission data specific to SMD | | |
| 3 | SMD | ATMS Diagnostic | ATMS diagnostic data routed to SMD only | | |
| 4 | HRD | ATMS RDR Science/Cal/Eng | ATMS mission data specific to HRD | | |
| 5 | | Reserved | Reserved / Spare for ATMS | | |
| 6 | SMD & HRD | CrIS RDR Science/Cal/Eng | CrIS mission data common to HRD & SMD | | |
| 7 | SMD | CrIS RDR Science/Cal/Eng | CrIS mission data specific to SMD | | |
| 8 | SMD | CrIS Diagnostic | CrIS diagnostic data routed to SMD only | | |
| 9 | HRD | CrIS RDR Science/Cal/Eng | CrIS mission data specific to HRD | | |
| 10 | | Reserved | Reserved / Spare for CrIS | | |
| 11 | SMD & HRD | OMPS RDR Science/Cal/Eng | OMPS mission data common to HRD & SMD | | |
| 12 | SMD | OMPS RDR Science/Cal/Eng | OMPS mission data specific to SMD | | |
| 13 | SMD | OMPS Diagnostic | OMPS diagnostic data routed to SMD only | | |
| 14 | HRD | OMPS RDR Science/Cal/Eng | OMPS mission data specific to HRD | | |
| 15 | | Reserved | Reserved / Spare for OMPS | | |
| 16 | SMD & HRD | VIIRS RDR Science/Cal/Eng | VIIRS mission data common to HRD & SMD | | |
| 17 | SMD | VIIRS RDR Science/Cal/Eng | VIIRS mission data specific to SMD | | |
| 18 | SMD | VIIRS Diagnostic | VIIRS diagnostic data routed to SMD only | | |
| 19 | HRD | VIIRS RDR Science/Cal/Eng | VIIRS mission data specific to HRD | | |
| 20 | | Reserved | Reserved / Spare for VIIRS | | |
| 21 | SMD | Instrument Dump/Dwell | Instrument Dump/Dwell data | | |
| 22 | | Reserved | Reserved for possible future use | | |
| 23 | SMD & HRD | CERES RDR Sci/Cal/Eng | CERES mission data common to HRD&SMD | | |
| 24 | SMD | CERES RDR Sci/Cal/Eng | CERES mission data specific to SMD | | |
| 25 | SMD | CERES Diagnostic | CERES diagnostic data routed to SMD only | | |
| 26 | HRD | CERES RDR Sci/Cal/Eng | CERES mission data specific to HRD | | |
| 27-31 | | Reserved | Reserved for possible future use | | |
| 32-62 | | Unused / Not Available | Not available for use on NPP | | |
| 63 | HRD | Fill Data | Fill VCDU to maintain 15-Mbps HRD rate | | |

Table 3.1.1 NPP Virtual Channel Assignments to Downlinks

Table 3.1.2 below lists the NPP data packets in order by APID. It lists their current assignment to a virtual channel and notes whether the packets inclusion in SMD or HRD is normal or only under special circumstances. The APIDs not listed are either spare/reserved APIDs or APIDs used for instrument commanding.

| DecHexUseUse00S/C0Bus Critical TelemetryNormalNormal11S/C0Bus H&S Telemetry – high rate (1 Hz)NormalNormal22S/C0Bus H&S Telemetry – low rate (1/16 Hz)NormalNormal33S/C0Bus DTU TelemetryNormalNormal44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0ADCS Diagnostic TelemetryNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal15FS/C0High Rate Star Tracker TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal< | Packet APID | | Source | VCID | Packet Description | SMD | HRD |
|---|-------------|-----|--------|------|---|---------|---------|
| 00S/C0Bus Critical TelemetryNormalNormal11S/C0Bus H&S Telemetry – high rate (1 Hz)NormalNormal22S/C0Bus H&S Telemetry – how rate (1/16 Hz)NormalNormal33S/C0Bus DTU TelemetryNormalNormal44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal15FS/C0High Rate Star Tracker TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0 | Dec | Hex | | | | Use | Use |
| 11S/C0Bus H&S Telemetry – high rate (1 Hz)NormalNormal22S/C0Bus H&S Telemetry – low rate (1/16 Hz)NormalNormal33S/C0Bus DTU TelemetryNormalNormal44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0ADCS Diagnostic TelemetryNormalNormal12CS/C0Bus FSW Telemetry – slowNormalNormal13DS/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic Telemetry #2, 1 HzNormalNormal2014S/C0 | 0 | 0 | S/C | 0 | Bus Critical Telemetry | Normal | Normal |
| 22S/C0Bus H&S Telemetry – low rate (1/16 Hz)NormalNormal33S/C0Bus DTU TelemetryNormalNormal44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – log rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 1 | 1 | S/C | 0 | Bus H&S Telemetry – high rate (1 Hz) | Normal | Normal |
| 33S/C0Bus DTU TelemetryNormalNormal44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0GADCS Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic Telemetry #2, 1 HzNormalNormal2014S/C0ADCS Diagnostic Telemetry #2, 1 HzNormalNormal | 2 | 2 | S/C | 0 | Bus H&S Telemetry – low rate (1/16 Hz) | Normal | Normal |
| 44S/C0Bus Thermal TelemetryNormalNormal55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal1610S/C0FSW Diagnostic TelemetryNormalNormal1711S/C0FSW Diagnostic TelemetryNormalNormal1812S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 3 | 3 | S/C | 0 | Bus DTU Telemetry | Normal | Normal |
| 55S/C0SSR TelemetryNormalNormal66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal15FS/C0High Rate Star Tracker TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 4 | 4 | S/C | 0 | Bus Thermal Telemetry | Normal | Normal |
| 66S/C0PUMA TelemetryNormalNormal77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal15FS/C0High Rate Star Tracker TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic Telemetry #2, 1 HzNormalNormal2014S/C0ADCS Diagnostic % HzNormalNormal | 5 | 5 | S/C | 0 | SSR Telemetry | Normal | Normal |
| 77S/C0DSEP TelemetryNormalNormal88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0High Rate Gyro TelemetryNormalNormal15FS/C0High Rate Star Tracker TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic, ½ HzNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 6 | 6 | S/C | 0 | PUMA Telemetry | Normal | Normal |
| 88S/C0ADCS HSK Telemetry – high rate (1 Hz)NormalNormal99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire Diagnostic, ½ HzNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 7 | 7 | S/C | 0 | DSEP Telemetry | Normal | Normal |
| 99S/C0ADCS HSK Telemetry – low rate (1/16 Hz)NormalNormal10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0TSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic, ½ HzNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 8 | 8 | S/C | 0 | ADCS HSK Telemetry – high rate (1 Hz) | Normal | Normal |
| 10AS/C0Time of Day Message packetNormalNormal11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic, ½ HzNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 9 | 9 | S/C | 0 | ADCS HSK Telemetry – low rate (1/16 Hz) | Normal | Normal |
| 11BS/C0Ephemeris/Attitude Message packetNormalNormal12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C0ADCS Diagnostic, ½ HzNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 10 | Α | S/C | 0 | Time of Day Message packet | Normal | Normal |
| 12CS/C0ADCS Diagnostic TelemetryNormalNormal13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal14ES/C0High Rate Gyro Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 11 | В | S/C | 0 | Ephemeris/Attitude Message packet | Normal | Normal |
| 13DS/C0Bus FSW Telemetry – fastNormalNormal14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 12 | С | S/C | 0 | ADCS Diagnostic Telemetry | Normal | Normal |
| 14ES/C0Bus FSW Telemetry – slowNormalNormal15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 13 | D | S/C | 0 | Bus FSW Telemetry – fast | Normal | Normal |
| 15FS/C0High Rate Gyro TelemetryNormalNormal1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 14 | E | S/C | 0 | Bus FSW Telemetry – slow | Normal | Normal |
| 1610S/C0High Rate Star Tracker TelemetryNormalNormal1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 15 | F | S/C | 0 | High Rate Gyro Telemetry | Normal | Normal |
| 1711S/C0FSW Diagnostic Telemetry #1, 1 HzNormalNormal1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 16 | 10 | S/C | 0 | High Rate Star Tracker Telemetry | Normal | Normal |
| 1812S/C0FSW Diagnostic Telemetry #2, 1 HzNormalNormal1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 17 | 11 | S/C | 0 | FSW Diagnostic Telemetry #1, 1 Hz | Normal | Normal |
| 1913S/C01394 / Firewire DiagnosticNormalNormal2014S/C0ADCS Diagnostic, ½ HzNormalNormal | 18 | 12 | S/C | 0 | FSW Diagnostic Telemetry #2, 1 Hz | Normal | Normal |
| 20 14 S/C 0 ADCS Diagnostic, ½ Hz Normal | 19 | 13 | S/C | 0 | 1394 / Firewire Diagnostic | Normal | Normal |
| | 20 | 14 | S/C | 0 | ADCS Diagnostic 1/2 Hz | Normal | Normal |
| I 21 I 15 I S/C I 0 I ADCS Diagnostic 1/16 Hz I Normal Normal | 21 | 15 | S/C | 0 | ADCS Diagnostic 1/16 Hz | Normal | Normal |
| 22 16 S/C 0 FSW Diagnostic ¹ / ₂ Hz Normal Normal | 22 | 16 | S/C | 0 | FSW Diagnostic ¹ / ₂ Hz | Normal | Normal |
| 23 17 S/C 0 FSW Diagnostic ¹ / ₂ Hz Normal Normal | 22 | 17 | 5/C | 0 | ESW Diagnostic, 1/2 Hz | Normal | Normal |
| 24 18 S/C 0 FSW/Diagnostic 1/16 Hz Normal Normal | 24 | 18 | S/C | 0 | ESW Diagnostic 1/16 Hz | Normal | Normal |
| 25 10 S/C 0 Share None None | 25 | 10 | 5/C | 0 | Spare | None | None |
| 25 19 5/C 0 Spare None None None | 25 | 13 | 5/C | 0 | Spare SCC Short Table Dump paaket | Special | Special |
| 20 IA S/C 0 SCC Short Table Dump packet Special Special 27 10 S/C 0 SCC Short Table Dump packet Special Special | 20 | | 3/0 | 0 | SCC Short Table Dump packet | Special | Special |
| 27 IB S/C 0 CDP Short Table Dump packet Special Special | 27 | 10 | 5/C | 0 | CDP Short Table Dump packet | Special | Special |
| 28 IC S/C U SCC Long Table Dump packet Special Special | 28 | | 5/0 | 0 | SCC Long Table Dump packet | Special | Special |
| 29 TD S/C 0 CDP Long Table Dump packet Special Special | 29 | | 5/0 | 0 | | Special | Special |
| 30 1E S/C 0 SCC FSW Startup & Kernel Frame Special Special | 30 | 1E | S/C | 0 | SCC FSW Startup & Kernel Frame | Special | Special |
| 31 1F S/C 0 DIU lest Mode Lelemetry Special Special | 31 | 11- | S/C | 0 | DIU lest Mode Telemetry | Special | Special |
| 32 20 S/C 0 SCC Fault Frame packet Special Special | 32 | 20 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 33 21 S/C 0 SCC Fault Frame packet Special | 33 | 21 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 34 22 S/C 0 SCC Fault Frame packet Special Special | 34 | 22 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 35 23 S/C 0 SCC Fault Frame packet Special Special | 35 | 23 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 36 24 S/C 0 SCC Fault Frame packet Special Special | 36 | 24 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 37 25 S/C 0 SCC Fault Frame packet Special Special | 37 | 25 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 38 26 S/C 0 SCC Fault Frame packet Special Special | 38 | 26 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 39 27 S/C 0 SCC Fault Frame packet Special Special | 39 | 27 | S/C | 0 | SCC Fault Frame packet | Special | Special |
| 40 28 S/C 0 CDP FSW Startup Frame Special Special | 40 | 28 | S/C | 0 | CDP FSW Startup Frame | Special | Special |
| 41 29 S/C 0 CDP Fault Frame packet Special Special | 41 | 29 | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 42 2A S/C 0 CDP Fault Frame packet Special Special | 42 | 2A | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 43 2B S/C 0 CDP Fault Frame packet Special Special | 43 | 2B | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 44 2C S/C 0 CDP Fault Frame packet Special Special | 44 | 2C | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 45 2D S/C 0 CDP Fault Frame packet Special Special | 45 | 2D | S/C | 0 | CDP Fault Frame packet | Special | Special |

Table 3.1.2 NPP Mission Data Packet Assignments (APID to VCID map)

| 46 | 2E | S/C | 0 | CDP Fault Frame packet | Special | Special |
|-----|-----|-------|----|--------------------------|---------|-----------|
| 47 | 2F | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 48 | 30 | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 49 | 31 | S/C | 0 | CDP Fault Frame packet | Special | Special |
| 70 | 46 | S/C | 0 | 1394 Housekeeping packet | Special | Special |
| 100 | 64 | S/C | 0 | S/C Test / Fill packet | Special | Special |
| 101 | 65 | S/C | 1 | S/C Test / Fill packet | Special | Special |
| 102 | 66 | S/C | 2 | S/C Test / Fill packet | Special | None |
| 103 | 67 | S/C | 3 | S/C Test / Fill packet | Special | None |
| 104 | 68 | S/C | 4 | S/C Test / Fill packet | None | Special |
| 105 | 69 | S/C | 5 | S/C Test / Fill packet | None | None None |
| 106 | 6A | S/C | 6 | S/C Test / Fill packet | Special | Special |
| 107 | 6B | S/C | 7 | S/C Test / Fill packet | Special | None |
| 108 | 6C | S/C | 8 | S/C Test / Fill packet | Special | None |
| 109 | 6D | S/C | 9 | S/C Test / Fill packet | None | Special |
| 110 | 6E | S/C | 10 | S/C Test / Fill packet | None | None |
| 111 | 6F | S/C | 11 | S/C Test / Fill packet | Special | Special |
| 112 | 70 | S/C | 12 | S/C Test / Fill packet | Special | None |
| 113 | 71 | S/C | 13 | S/C Test / Fill packet | Special | None |
| 114 | 72 | S/C | 14 | S/C Test / Fill packet | None | Special |
| 115 | 73 | S/C | 15 | S/C Test / Fill packet | None | None |
| 116 | 74 | S/C | 16 | S/C Test / Fill packet | Special | Special |
| 117 | 75 | S/C | 17 | S/C Test / Fill packet | Special | None |
| 118 | 76 | S/C | 18 | S/C Test / Fill packet | Special | None |
| 119 | 77 | S/C | 19 | S/C Test / Fill packet | None | Special |
| 120 | 78 | S/C | 20 | S/C Test / Fill packet | None | None |
| 121 | 79 | S/C | 21 | S/C Test / Fill packet | Special | None |
| 122 | 7A | S/C | 22 | S/C Test / Fill packet | None | None |
| 123 | 7B | S/C | 23 | S/C Test / Fill packet | Special | Special |
| 124 | 7C | S/C | 24 | S/C Test / Fill packet | Special | None |
| 125 | 7D | S/C | 25 | S/C Test / Fill packet | Special | None |
| 126 | 7E | S/C | 26 | S/C Test / Fill packet | None | Special |
| 127 | 7F | S/C | 27 | S/C Test / Fill packet | None | None |
| 128 | 80 | S/C | 28 | S/C Test / Fill packet | None | None |
| 129 | 81 | S/C | 29 | S/C Test / Fill packet | None | None |
| 130 | 82 | S/C | 30 | S/C Test / Fill packet | None | None |
| 131 | 83 | S/C | 31 | S/C Test / Fill packet | None | None |
| 146 | 92 | CERES | 0 | Housekeeping | Normal | Normal |
| 147 | 93 | CERES | 23 | | Normal | Normal |
| 148 | 94 | CERES | 23 | Fixed Pattern | Special | Special |
| 149 | 95 | CERES | 23 | Science | Normal | Normal |
| 150 | 96 | CERES | 23 | Diagnostic | Special | Special |
| 155 | 9B | CERES | 0 | LEO&A Housekeeping | Normal | Normal |
| 512 | 200 | ATMS | 0 | Command Status | Normal | Normal |
| 513 | 201 | ATMS | 0 | LEO&A Housekeeping | Normal | Normal |
| 514 | 202 | ATMS | 3 | Test | Special | None |
| 515 | 203 | ATMS | 1 | Calibration | Normal | Normal |
| 516 | 204 | ATMS | 3 | Diagnostic | Special | None |
| 517 | 205 | ATMS | 21 | Dwell | Special | None |

| 518 | 206 | ATMS | 0 | Housekeeping | Normal | Normal |
|-----|-----|-------|----|--|---------|---------|
| 524 | 20C | ATMS | 21 | Memory Dump | Special | None |
| 528 | 210 | ATMS | 1 | Science | Normal | Normal |
| 530 | 212 | ATMS | 1 | Engineering – Hot Cal | Normal | Normal |
| 531 | 213 | ATMS | 1 | Engineering – Health & Status | Normal | Normal |
| 536 | 218 | ATMS | 3 | Diagnostic Science | Special | None |
| 543 | 21F | ATMS | 0 | Hardware Error Status | Normal | Normal |
| 544 | 220 | OMPS | 0 | Housekeeping | Normal | Normal |
| 545 | 221 | OMPS | 0 | LEO&A Housekeeping | Normal | Normal |
| 546 | 222 | OMPS | 13 | Test | Special | None |
| 547 | 223 | OMPS | 11 | Calibration | Normal | Normal |
| 548 | 224 | OMPS | 11 | Engineering | Normal | Normal |
| 549 | 225 | OMPS | 21 | Dwell | Special | None |
| 550 | 226 | OMPS | 0 | Diagnostic – FSW Bootup Status | Special | None |
| 556 | 22C | OMPS | 21 | Memory Dump | Special | None |
| 560 | 230 | OMPS | 11 | Science – Nadir Total Column | Normal | Normal |
| 561 | 231 | OMPS | 11 | Science – Nadir Profiler 📐 📎 | Normal | Normal |
| 562 | 232 | OMPS | 11 | Science – Limb Profiler, Long Exposure | Normal | Normal |
| 563 | 233 | OMPS | 11 | Science – Limb Profiler, Short Exposure | Normal | Normal |
| 564 | 234 | OMPS | 11 | Science – Nadir Total Column Calibration | Normal | Normal |
| 565 | 235 | OMPS | 11 | Science – Nadir Profiler Calibration | Normal | Normal |
| 566 | 236 | OMPS | 11 | Science – Limb Profiler Calibration | Normal | Normal |
| 576 | 240 | OMPS | 13 | Diagnostic – Nadir Total Column | Special | None |
| 577 | 241 | OMPS | 13 | Diagnostic – Nadir Profiler | Special | None |
| 578 | 242 | OMPS | 13 | Diagnostic – Limb Profiler Long | Special | None |
| 579 | 243 | OMPS | 13 | Diagnostic – Limb Profiler Short | Special | None |
| 580 | 244 | OMPS | 13 | Diagnostic – Total Column Calibration | Special | None |
| 581 | 245 | OMPS | 13 | Diagnostic – Nadir Profiler Calibration | Special | None |
| 582 | 246 | OMPS | 13 | Diagnostic – Limb Profiler Calibration | Special | None |
| 768 | 300 | VIIRS | 0 | Housekeeping | Normal | Normal |
| 769 | 301 | VIIRS | 0 | LEO&A Housekeeping | Normal | Normal |
| 770 | 302 | VIIRS | 18 | lest Packet | Special | None |
| 773 | 305 | VIIRS | 0 | Diagnostic Dwell Telemetry | Special | Special |
| 780 | 30C | VIIRS | 21 | Memory Dump | Special | None |
| 800 | 320 | VIIRS | 16 | Science – M04 | Normal | Normal |
| 801 | 321 | VIIRS | 16 | Science – M05 | Normal | Normal |
| 802 | 322 | VIIRS | 16 | Science – M03 | Normal | Normal |
| 803 | 323 | VIIRS | 16 | Science – M02 | Normal | Normal |
| 804 | 324 | VIIRS | 16 | Science – M01 | Normal | Normal |
| 805 | 325 | VIIRS | 16 | Science – M06 | Normal | Normal |
| 806 | 326 | VIIRS | 16 | Science – M07 | Normal | Normal |
| 807 | 327 | | 16 | Science – MU9 | Normal | Normal |
| 808 | 328 | VIIRS | 16 | Science – M10 | Normal | Normal |
| 809 | 329 | | 16 | Science – MU8 | Normal | Normal |
| 810 | 32A | | 16 | Science – M11 | Normal | Normal |
| 811 | 32B | | 16 | Science – M13 | Normal | Normal |
| 012 | 320 | | 10 | | Normal | Normal |
| 813 | 32D | | 10 | Science – IU4 | Normal | INORMAL |
| 814 | 32E | VIIRS | 16 | Science – M16 | Normal | INORMAI |

| 815 32F VIIRS 16 Science – M15 Normal Normal 816 330 VIIRS 16 Science – I05 Normal Normal 817 331 VIIRS 16 Science – I01 Normal Normal 818 332 VIIRS 16 Science – I02 Normal Normal 820 334 VIIRS 16 Science – DNB Normal Normal 821 336 VIIRS 16 Science – DNB IGS Normal Normal 822 336 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 16 HRD Engineering Normal Normal 830 33E VIIRS 18 Diagnostic – M05 Special None 833 341 VIIRS 18 Diagnostic – M01 Special None 834 342 VIIRS 18 Diagnostic – M03 Special None | | | | | | | |
|--|------|-----|-------|----|------------------------------|---------|--------|
| 816 330 VIIRS 16 Science – I05 Normal Normal 817 331 VIIRS 16 Science – I05 Normal Normal 818 332 VIIRS 16 Science – I01 Normal Normal 820 334 VIIRS 16 Science – I03 Normal Normal 821 335 VIIRS 16 Science – DNB MGS Normal Normal 822 334 VIIRS 16 Science – DNB MGS Normal Normal 823 337 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 18 Diagnostic – M04 Special None 831 341 VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M07 Special None 835 343 VIIRS 18 Diagnostic – M07 Special None | 815 | 32F | VIIRS | 16 | Science – M15 | Normal | Normal |
| 817 331 VIIRS 16 Science - I05 Normal Normal 818 332 VIIRS 16 Science - I01 Normal Normal 820 334 VIIRS 16 Science - I03 Normal Normal 821 335 VIIRS 16 Science - DNB MGS Normal Normal 822 336 VIIRS 16 Science - DNB LGS Normal Normal 825 337 VIIRS 16 HRD Calibration Normal Normal 830 33E VIIRS 16 HRD Engineering Normal Normal 831 33F VIIRS 18 Diagnostic - M05 Special None 833 341 VIIRS 18 Diagnostic - M03 Special None 834 342 VIIRS 18 Diagnostic - M03 Special None 837 345 VIIRS 18 Diagnostic - M09 Special None | 816 | 330 | VIIRS | 16 | Science – M14 | Normal | Normal |
| 818 332 VIIRS 16 Science - I01 Normal Normal 819 333 VIIRS 16 Science - I02 Normal Normal 820 334 VIIRS 16 Science - DNB Normal Normal 821 335 VIIRS 16 Science - DNB MGS Normal Normal 823 337 VIIRS 16 Science - DNB LGS Normal Normal 826 33A VIIRS 16 HRD Calibration Normal Normal 830 33E VIIRS 18 Diagnostic - M04 Special None 833 341 VIIRS 18 Diagnostic - M03 Special None 833 341 VIIRS 18 Diagnostic - M02 Special None 833 341 VIIRS 18 Diagnostic - M09 Special None 833 341 VIIRS 18 Diagnostic - M10 Special None | 817 | 331 | VIIRS | 16 | Science – I05 | Normal | Normal |
| 819 333 VIIRS 16 Science - I02 Normal Normal 820 334 VIIRS 16 Science - DNB Normal Normal 821 335 VIIRS 16 Science - DNB Normal Normal 822 336 VIIRS 16 Science - DNB LGS Normal Normal 823 337 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 16 HRD Engineering Normal Normal 830 33E VIIRS 18 Diagnostic - M03 Special None 831 33F VIIRS 18 Diagnostic - M02 Special None 833 344 VIIRS 18 Diagnostic - M03 Special None 836 344 VIIRS 18 Diagnostic - M03 Special None 837 345 VIIRS 18 Diagnostic - M03 Special None | 818 | 332 | VIIRS | 16 | Science – I01 | Normal | Normal |
| 820 334 VIIRS 16 Science - D03 Normal Normal 821 335 VIIRS 16 Science - DNB Normal Normal 822 336 VIIRS 16 Science - DNB LGS Normal Normal 825 339 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 18 Diagnostic - M04 Special None 831 33F VIIRS 18 Diagnostic - M03 Special None 832 340 VIIRS 18 Diagnostic - M03 Special None 833 341 VIIRS 18 Diagnostic - M07 Special None 835 343 VIIRS 18 Diagnostic - M09 Special None 837 345 VIIRS 18 Diagnostic - M10 Special None | 819 | 333 | VIIRS | 16 | Science – I02 | Normal | Normal |
| 821 335 VIIRS 16 Science – DNB Normal Normal 823 337 VIIRS 16 Science – DNB LGS Normal Normal 825 339 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 16 HRD Calibration Normal Normal 830 33E VIIRS 18 Diagnostic – M04 Special None 831 33F VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M02 Special None 836 344 VIIRS 18 Diagnostic – M06 Special None 837 345 VIIRS 18 Diagnostic – M08 Special None 838 346 VIIRS 18 Diagnostic – M08 Special None 839 347 VIIRS 18 Diagnostic – M13 Special None | 820 | 334 | VIIRS | 16 | Science – 103 | Normal | Normal |
| 822 336 VIIRS 16 Science – DNB MGS Normal Normal 823 337 VIIRS 16 Science – DNB LGS Normal Normal 826 334 VIIRS 16 HRD Calibration Normal Normal 830 33E VIIRS 16 HRD Engineering Normal Normal 831 33F VIIRS 18 Diagnostic – M05 Special None 832 340 VIIRS 18 Diagnostic – M05 Special None 833 341 VIIRS 18 Diagnostic – M01 Special None 835 343 VIIRS 18 Diagnostic – M07 Special None 836 346 VIIRS 18 Diagnostic – M08 Special None 838 346 VIIRS 18 Diagnostic – M08 Special None 840 348 VIIRS 18 Diagnostic – M12 Special None < | 821 | 335 | VIIRS | 16 | Science – DNB | Normal | Normal |
| E23 337 VIIRS 16 Science – DNB LGS Normal Normal 826 339 VIIRS 16 HRD Engineering Normal Normal 830 33E VIIRS 18 Diagnostic – M04 Special Norne 831 33F VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M03 Special None 834 342 VIIRS 18 Diagnostic – M03 Special None 835 343 VIIRS 18 Diagnostic – M03 Special None 837 345 VIIRS 18 Diagnostic – M03 Special None 838 346 VIIRS 18 Diagnostic – M13 Special None 841 349 VIIRS 18 Diagnostic – M13 Special None <t< td=""><td>822</td><td>336</td><td>VIIRS</td><td>16</td><td>Science – DNB MGS</td><td>Normal</td><td>Normal</td></t<> | 822 | 336 | VIIRS | 16 | Science – DNB MGS | Normal | Normal |
| 825 339 VIIRS 16 HRD Calibration Normal Normal 826 33A VIIRS 18 Diagnostic - M04 Special None 830 33E VIIRS 18 Diagnostic - M03 Special None 831 33F VIIRS 18 Diagnostic - M03 Special None 833 341 VIIRS 18 Diagnostic - M01 Special None 834 342 VIIRS 18 Diagnostic - M06 Special None 835 343 VIIRS 18 Diagnostic - M07 Special None 837 345 VIIRS 18 Diagnostic - M08 Special None 838 346 VIIRS 18 Diagnostic - M11 Special None 840 348 VIIRS 18 Diagnostic - M13 Special None 841 349 VIIRS 18 Diagnostic - M15 Special None | 823 | 337 | VIIRS | 16 | Science – DNB LGS | Normal | Normal |
| 826 33A VIIRS 16 HRD Engineering Normal Normal 830 33E VIIRS 18 Diagnostic – M04 Special None 831 33F VIIRS 18 Diagnostic – M03 Special None 832 340 VIIRS 18 Diagnostic – M02 Special None 833 341 VIIRS 18 Diagnostic – M01 Special None 834 342 VIIRS 18 Diagnostic – M06 Special None 835 343 VIIRS 18 Diagnostic – M07 Special None 838 346 VIIRS 18 Diagnostic – M08 Special None 840 347 VIIRS 18 Diagnostic – M13 Special None 841 349 VIIRS 18 Diagnostic – M13 Special None 843 344 VIIRS 18 Diagnostic – M13 Special None | 825 | 339 | VIIRS | 16 | HRD Calibration | Normal | Normal |
| 830 33E VIIRS 18 Diagnostic – M04 Special None 831 33F VIIRS 18 Diagnostic – M03 Special None 832 340 VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M01 Special None 834 342 VIIRS 18 Diagnostic – M06 Special None 836 344 VIIRS 18 Diagnostic – M09 Special None 837 345 VIIRS 18 Diagnostic – M09 Special None 838 346 VIIRS 18 Diagnostic – M10 Special None 839 347 VIIRS 18 Diagnostic – M13 Special None 841 349 VIIRS 18 Diagnostic – M13 Special None 843 34E VIIRS 18 Diagnostic – M16 Special None | 826 | 33A | VIIRS | 16 | HRD Engineering | Normal | Normal |
| 831 33F VIIRS 18 Diagnostic – M05 Special None 832 340 VIIRS 18 Diagnostic – M02 Special None 833 341 VIIRS 18 Diagnostic – M02 Special None 834 342 VIIRS 18 Diagnostic – M01 Special None 835 343 VIIRS 18 Diagnostic – M06 Special None 836 344 VIIRS 18 Diagnostic – M09 Special None 837 345 VIIRS 18 Diagnostic – M03 Special None 838 346 VIIRS 18 Diagnostic – M10 Special None 840 348 VIIRS 18 Diagnostic – M12 Special None 841 349 VIIRS 18 Diagnostic – M12 Special None 843 34B VIIRS 18 Diagnostic – M14 Special None | 830 | 33E | VIIRS | 18 | Diagnostic – M04 | Special | None |
| 832 340 VIIRS 18 Diagnostic – M03 Special None 833 341 VIIRS 18 Diagnostic – M02 Special None 834 342 VIIRS 18 Diagnostic – M01 Special None 835 343 VIIRS 18 Diagnostic – M06 Special None 836 344 VIIRS 18 Diagnostic – M09 Special None 837 345 VIIRS 18 Diagnostic – M10 Special None 838 346 VIIRS 18 Diagnostic – M13 Special None 840 348 VIIRS 18 Diagnostic – M13 Special None 841 349 VIIRS 18 Diagnostic – M13 Special None 843 34B VIIRS 18 Diagnostic – M16 Special None 844 34C VIIRS 18 Diagnostic – I05 Special None | 831 | 33F | VIIRS | 18 | Diagnostic – M05 | Special | None |
| 833 341 VIIRS 18 Diagnostic - M02 Special None 834 342 VIIRS 18 Diagnostic - M01 Special None 835 343 VIIRS 18 Diagnostic - M06 Special None 836 344 VIIRS 18 Diagnostic - M07 Special None 837 345 VIIRS 18 Diagnostic - M07 Special None 838 346 VIIRS 18 Diagnostic - M10 Special None 840 348 VIIRS 18 Diagnostic - M13 Special None 841 349 VIIRS 18 Diagnostic - M13 Special None 843 34B VIIRS 18 Diagnostic - M16 Special None 844 34C VIIRS 18 Diagnostic - M16 Special None 844 34D VIIRS 18 Diagnostic - I01 Special None | 832 | 340 | VIIRS | 18 | Diagnostic – M03 | Special | None |
| 834 342 VIIRS 18 Diagnostic - M01 Special None 835 343 VIIRS 18 Diagnostic - M06 Special None 836 344 VIIRS 18 Diagnostic - M07 Special None 837 345 VIIRS 18 Diagnostic - M09 Special None 838 346 VIIRS 18 Diagnostic - M09 Special None 840 348 VIIRS 18 Diagnostic - M10 Special None 841 349 VIIRS 18 Diagnostic - M13 Special None 843 34B VIIRS 18 Diagnostic - M12 Special None 8443 34C VIIRS 18 Diagnostic - M16 Special None 8445 34D VIIRS 18 Diagnostic - I01 Special None 846 350 VIIRS 18 Diagnostic - I01 Special None <tr< td=""><td>833</td><td>341</td><td>VIIRS</td><td>18</td><td>Diagnostic – M02</td><td>Special</td><td>None</td></tr<> | 833 | 341 | VIIRS | 18 | Diagnostic – M02 | Special | None |
| 835 343 VIIRS 18 Diagnostic - M06 Special None 836 344 VIIRS 18 Diagnostic - M07 Special None 837 345 VIIRS 18 Diagnostic - M09 Special None 838 346 VIIRS 18 Diagnostic - M10 Special None 839 347 VIIRS 18 Diagnostic - M10 Special None 840 348 VIIRS 18 Diagnostic - M11 Special None 841 349 VIIRS 18 Diagnostic - M12 Special None 843 34B VIIRS 18 Diagnostic - M16 Special None 844 34C VIIRS 18 Diagnostic - M14 Special None 846 34E VIIRS 18 Diagnostic - I01 Special None 847 34F VIIRS 18 Diagnostic - I03 Special None | 834 | 342 | VIIRS | 18 | Diagnostic – M01 | Special | None |
| 836 344 VIIRS 18 Diagnostic - M07 Special None 837 345 VIIRS 18 Diagnostic - M09 Special None 838 346 VIIRS 18 Diagnostic - M09 Special None 839 347 VIIRS 18 Diagnostic - M08 Special None 840 348 VIIRS 18 Diagnostic - M11 Special None 841 349 VIIRS 18 Diagnostic - M12 Special None 843 34L VIIRS 18 Diagnostic - M16 Special None 843 34D VIIRS 18 Diagnostic - M16 Special None 844 34C VIIRS 18 Diagnostic - M15 Special None 844 34D VIIRS 18 Diagnostic - I01 Special None 844 350 VIIRS 18 Diagnostic - DNB Special None | 835 | 343 | VIIRS | 18 | Diagnostic – M06 | Special | None |
| 837 345 VIIRS 18 Diagnostic - M09 Special None 838 346 VIIRS 18 Diagnostic - M10 Special None 839 347 VIIRS 18 Diagnostic - M08 Special None 840 348 VIIRS 18 Diagnostic - M13 Special None 841 349 VIIRS 18 Diagnostic - M13 Special None 843 34B VIIRS 18 Diagnostic - M12 Special None 843 34B VIIRS 18 Diagnostic - M15 Special None 844 34C VIIRS 18 Diagnostic - M15 Special None 844 34C VIIRS 18 Diagnostic - I05 Special None 845 34D VIIRS 18 Diagnostic - I02 Special None 844 351 VIIRS 18 Diagnostic - DNB Special None | 836 | 344 | VIIRS | 18 | Diagnostic – M07 | Special | None |
| 838 346 VIIRS 18 Diagnostic - M10 Special None 839 347 VIIRS 18 Diagnostic - M08 Special None 840 348 VIIRS 18 Diagnostic - M11 Special None 841 349 VIIRS 18 Diagnostic - M12 Special None 842 34A VIIRS 18 Diagnostic - M12 Special None 843 34B VIIRS 18 Diagnostic - M12 Special None 844 34C VIIRS 18 Diagnostic - M15 Special None 844 34C VIIRS 18 Diagnostic - M14 Special None 846 34E VIIRS 18 Diagnostic - I01 Special None 847 34F VIIRS 18 Diagnostic - I03 Special None 850 352 VIIRS 18 Diagnostic - DNB Special None | 837 | 345 | VIIRS | 18 | Diagnostic – M09 | Special | None |
| 839 347 VIIRS 18 Diagnostic – M08 Special None 840 348 VIIRS 18 Diagnostic – M11 Special None 841 349 VIIRS 18 Diagnostic – M13 Special None 842 34A VIIRS 18 Diagnostic – M12 Special None 843 34B VIIRS 18 Diagnostic – M16 Special None 844 34C VIIRS 18 Diagnostic – M16 Special None 844 34C VIIRS 18 Diagnostic – M15 Special None 844 34E VIIRS 18 Diagnostic – I05 Special None 848 350 VIIRS 18 Diagnostic – I03 Special None 849 351 VIIRS 18 Diagnostic – DNB Special None 851 353 VIIRS 18 Diagnostic – DNB MGS Special None < | 838 | 346 | VIIRS | 18 | Diagnostic – M10 | Special | None |
| 840348VIIRS18Diagnostic – M11SpecialNone841349VIIRS18Diagnostic – M13SpecialNone84234AVIIRS18Diagnostic – M12SpecialNone84334BVIIRS18Diagnostic – M16SpecialNone84434CVIIRS18Diagnostic – M16SpecialNone84434CVIIRS18Diagnostic – M16SpecialNone84534DVIIRS18Diagnostic – M14SpecialNone84634EVIIRS18Diagnostic – I05SpecialNone84734FVIIRS18Diagnostic – I05SpecialNone849350VIIRS18Diagnostic – I03SpecialNone850352VIIRS18Diagnostic – D03SpecialNone851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone856357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone1280500CrlS0Housekeeping #1NormalNormal1281501CrlS0Housekeeping #4NormalNormal </td <td>839</td> <td>347</td> <td>VIIRS</td> <td>18</td> <td>Diagnostic – M08</td> <td>Special</td> <td>None</td> | 839 | 347 | VIIRS | 18 | Diagnostic – M08 | Special | None |
| 841349VIIRS18Diagnostic – M13SpecialNone84234AVIIRS18Diagnostic – M12SpecialNone84334BVIIRS18Diagnostic – I04SpecialNone84434CVIIRS18Diagnostic – M16SpecialNone84434CVIIRS18Diagnostic – M16SpecialNone84534DVIIRS18Diagnostic – M14SpecialNone84634EVIIRS18Diagnostic – I05SpecialNone84734FVIIRS18Diagnostic – I05SpecialNone848350VIIRS18Diagnostic – I01SpecialNone849351VIIRS18Diagnostic – I02SpecialNone850352VIIRS18Diagnostic – DNBSpecialNone851353VIIRS18Diagnostic – DNB MGSSpecialNone852354VIIRS18Diagnostic – DNB LGSSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone826358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #2NormalNormal1281501CrIS0Housekeeping #3NormalNormal1284504CrIS0Housekeeping #6NormalNormal <td>840</td> <td>348</td> <td>VIIRS</td> <td>18</td> <td>Diagnostic – M11</td> <td>Special</td> <td>None</td> | 840 | 348 | VIIRS | 18 | Diagnostic – M11 | Special | None |
| 84234AVIIRS18Diagnostic - M12SpecialNone84334BVIIRS18Diagnostic - I04SpecialNone84434CVIIRS18Diagnostic - M16SpecialNone84534DVIIRS18Diagnostic - M15SpecialNone84634EVIIRS18Diagnostic - M14SpecialNone84734FVIIRS18Diagnostic - I05SpecialNone848350VIIRS18Diagnostic - I01SpecialNone849351VIIRS18Diagnostic - I02SpecialNone850352VIIRS18Diagnostic - DNBSpecialNone851353VIIRS18Diagnostic - DNBSpecialNone853355VIIRS18Diagnostic - DNB MGSSpecialNone855357VIIRS18Diagnostic - HRD CalibrationSpecialNone856358VIIRS18Diagnostic - HRD CalibrationSpecialNone1280500CrIS0Housekeeping #2NormalNormal1281501CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #8NormalNormal <td>841</td> <td>349</td> <td>VIIRS</td> <td>18</td> <td>Diagnostic – M13</td> <td>Special</td> <td>None</td> | 841 | 349 | VIIRS | 18 | Diagnostic – M13 | Special | None |
| 84334BVIIRS18Diagnostic - I04SpecialNone84434CVIIRS18Diagnostic - M16SpecialNone84534DVIIRS18Diagnostic - M15SpecialNone84634EVIIRS18Diagnostic - M14SpecialNone84734FVIIRS18Diagnostic - I05SpecialNone848350VIIRS18Diagnostic - I01SpecialNone849351VIIRS18Diagnostic - I02SpecialNone850352VIIRS18Diagnostic - DNBSpecialNone851353VIIRS18Diagnostic - DNBSpecialNone852354VIIRS18Diagnostic - DNB MGSSpecialNone853355VIIRS18Diagnostic - DNB LGSSpecialNone856358VIIRS18Diagnostic - HRD CalibrationSpecialNone856358VIIRS18Diagnostic - HRD CalibrationSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #3NormalNormal1284504CrIS0Housekeeping #4NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0Housekeeping #8NormalNormal | 842 | 34A | VIIRS | 18 | Diagnostic – M12 | Special | None |
| 84434CVIIRS18Diagnostic - M16SpecialNone84534DVIIRS18Diagnostic - M15SpecialNone84634EVIIRS18Diagnostic - M14SpecialNone84734FVIIRS18Diagnostic - I05SpecialNone848350VIIRS18Diagnostic - I01SpecialNone849351VIIRS18Diagnostic - I02SpecialNone850352VIIRS18Diagnostic - I03SpecialNone851353VIIRS18Diagnostic - DNBSpecialNone852354VIIRS18Diagnostic - DNB MGSSpecialNone855357VIIRS18Diagnostic - HRD CalibrationSpecialNone856358VIIRS18Diagnostic - HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0LEO&A HousekeepingNormalNormal1286509CrIS6Science TelemetryNormalNormal< | 843 | 34B | VIIRS | 18 | Diagnostic – 104 | Special | None |
| 84534DVIIRS18Diagnostic – M15SpecialNone84634EVIIRS18Diagnostic – M14SpecialNone84734FVIIRS18Diagnostic – I05SpecialNone848350VIIRS18Diagnostic – I01SpecialNone849351VIIRS18Diagnostic – I02SpecialNone850352VIIRS18Diagnostic – I03SpecialNone851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #7NormalNormal1285505CrIS0Housekeeping #8NormalNormal1286508CrIS0LEO&A HousekeepingNormalNormal1286509CrIS6Science TelemetryNormalNormal </td <td>844</td> <td>34C</td> <td>VIIRS</td> <td>18</td> <td>Diagnostic – M16</td> <td>Special</td> <td>None</td> | 844 | 34C | VIIRS | 18 | Diagnostic – M16 | Special | None |
| 84634EVIIRS18Diagnostic – M14SpecialNone84734FVIIRS18Diagnostic – I05SpecialNone848350VIIRS18Diagnostic – I01SpecialNone849351VIIRS18Diagnostic – I02SpecialNone850352VIIRS18Diagnostic – I03SpecialNone851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286508CrIS0LEO&A HousekeepingNormalNormal1286509CrIS6Science TelemetryNormalNormal1289509CrIS6Science TelemetryNormalNormal< | 845 | 34D | VIIRS | 18 | Diagnostic – M15 | Special | None |
| 84734FVIIRS18Diagnostic - I05SpecialNone848350VIIRS18Diagnostic - I01SpecialNone849351VIIRS18Diagnostic - I02SpecialNone850352VIIRS18Diagnostic - I03SpecialNone851353VIIRS18Diagnostic - DNBSpecialNone852354VIIRS18Diagnostic - DNB MGSSpecialNone853355VIIRS18Diagnostic - DNB LGSSpecialNone855357VIIRS18Diagnostic - HRD CalibrationSpecialNone856358VIIRS18Diagnostic - HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0LEO&A HousekeepingNormalNormal1287507CrIS0LEO&A HousekeepingNormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNorm | 846 | 34E | VIIRS | 18 | Diagnostic – M14 | Special | None |
| 848350VIIRS18Diagnostic - I01SpecialNone849351VIIRS18Diagnostic - I02SpecialNone850352VIIRS18Diagnostic - I03SpecialNone851353VIIRS18Diagnostic - DNBSpecialNone852354VIIRS18Diagnostic - DNB MGSSpecialNone853355VIIRS18Diagnostic - DNB LGSSpecialNone855357VIIRS18Diagnostic - HRD CalibrationSpecialNone856358VIIRS18Diagnostic - HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #3NormalNormal1282502CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286508CrIS0LEO&A HousekeepingNormalNormal1288508CrIS6Science TelemetryNormalNormal1289509CrIS6Engineering TelemetryNormalNormal129050ACrIS21Housekeeping TelemetryNormalNormal1291508CrIS21Housekeeping TelemetryNorm | 847 | 34F | VIIRS | 18 | Diagnostic – 105 | Special | None |
| 849351VIIRS18Diagnostic – I02SpecialNone850352VIIRS18Diagnostic – I03SpecialNone851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #4NormalNormal1283503CrIS0Housekeeping #5NormalNormal1284504CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0LEO&A HousekeepingNormalNormal1288508CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNormal | 848 | 350 | VIIRS | 18 | Diagnostic – I01 | Special | None |
| 850352VIIRS18Diagnostic – I03SpecialNone851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0Housekeeping #8NormalNormal1287507CrIS0LEO&A HousekeepingNormalNormal1288508CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNormal | 849 | 351 | VIIRS | 18 | Diagnostic – 102 | Special | None |
| 851353VIIRS18Diagnostic – DNBSpecialNone852354VIIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #6NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0Housekeeping #8NormalNormal1287507CrIS0LEO&A HousekeepingNormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS21Housekeeping Telemetry DwellSpecialNormal | 850 | 352 | VIIRS | 18 | Diagnostic – 103 | Special | None |
| 852354VIRS18Diagnostic – DNB MGSSpecialNone853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD CalibrationSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #7NormalNormal1286506CrIS0Housekeeping #8NormalNormal1287507CrIS0LEO&A HousekeepingNormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNormal | 851 | 353 | VIIRS | 18 | Diagnostic – DNB | Special | None |
| 853355VIIRS18Diagnostic – DNB LGSSpecialNone855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 852 | 354 | VIIRS | 18 | Diagnostic – DNB MGS | Special | None |
| 855357VIIRS18Diagnostic – HRD CalibrationSpecialNone856358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS21Housekeeping Telemetry DwellSpecialNormal | 853 | 355 | VIIRS | 18 | Diagnostic – DNB LGS | Special | None |
| 856358VIIRS18Diagnostic – HRD EngineeringSpecialNone1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS21Housekeeping Telemetry DwellSpecialNormal | 855 | 357 | VIIRS | 18 | Diagnostic – HRD Calibration | Special | None |
| 1280500CrIS0Housekeeping #1NormalNormal1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNore | 856 | 358 | VIIRS | 18 | Diagnostic – HRD Engineering | Special | None |
| 1281501CrIS0Housekeeping #2NormalNormal1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNore | 1280 | 500 | CrIS | 0 | Housekeeping #1 | Normal | Normal |
| 1282502CrIS0Housekeeping #3NormalNormal1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNore | 1281 | 501 | CrIS | 0 | Housekeepina #2 | Normal | Normal |
| 1283503CrIS0Housekeeping #4NormalNormal1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1282 | 502 | CrIS | 0 | Housekeeping #3 | Normal | Normal |
| 1284504CrIS0Housekeeping #5NormalNormal1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1283 | 503 | CrIS | 0 | Housekeepina #4 | Normal | Normal |
| 1285505CrIS0Housekeeping #6NormalNormal1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1284 | 504 | CrIS | 0 | Housekeepina #5 | Normal | Normal |
| 1286506CrIS0Housekeeping #7NormalNormal1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1285 | 505 | CrIS | 0 | Housekeepina #6 | Normal | Normal |
| 1287507CrIS0Housekeeping #8NormalNormal1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1286 | 506 | CrIS | 0 | Housekeepina #7 | Normal | Normal |
| 1288508CrIS0LEO&A HousekeepingNormalNormal1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1287 | 507 | CrIS | 0 | Housekeepina #8 | Normal | Normal |
| 1289509CrIS6Science TelemetryNormalNormal129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1288 | 508 | CrIS | 0 | LEO&A Housekeeping | Normal | Normal |
| 129050ACrIS6Engineering TelemetryNormalNormal129150BCrIS21Housekeeping Telemetry DwellSpecialNone | 1289 | 509 | CrIS | 6 | Science Telemetrv | Normal | Normal |
| 1291 50B CrIS 21 Housekeeping Telemetry Dwell Special None | 1290 | 50A | CrIS | 6 | Engineering Telemetrv | Normal | Normal |
| | 1291 | 50B | CrIS | 21 | Housekeeping Telemetry Dwell | Special | None |

| 1292 | 50C | CrIS | 21 | SSM Telemetry Dwell | Special | None |
|------|-----|------|----|---------------------|---------|--------|
| 1293 | 50D | CrIS | 21 | IFM Telemetry Dwell | Special | None |
| 1294 | 50E | CrIS | 8 | LW Diagnostic RDR | Special | None |
| 1295 | 50F | CrIS | 8 | MW Diagnostic RDR | Special | None |
| 1296 | 510 | CrIS | 8 | SW Diagnostic RDR | Special | None |
| 1315 | 523 | CrIS | 6 | LW 1 Earth Scene | Normal | Normal |
| 1316 | 524 | CrIS | 6 | LW 2 Earth Scene | Normal | Normal |
| 1317 | 525 | CrIS | 6 | LW 3 Earth Scene | Normal | Normal |
| 1318 | 526 | CrIS | 6 | LW 4 Earth Scene | Normal | Normal |
| 1319 | 527 | CrIS | 6 | LW 5 Earth Scene | Normal | Normal |
| 1320 | 528 | CrIS | 6 | LW 6 Earth Scene | Normal | Normal |
| 1321 | 529 | CrIS | 6 | LW 7 Earth Scene | Normal | Normal |
| 1322 | 52A | CrIS | 6 | LW 8 Earth Scene | Normal | Normal |
| 1323 | 52B | CrIS | 6 | LW 9 Earth Scene | Normal | Normal |
| 1324 | 52C | CrIS | 6 | MW 1 Earth Scene | Normal | Normal |
| 1325 | 52D | CrIS | 6 | MW 2 Earth Scene | Normal | Normal |
| 1326 | 52E | CrIS | 6 | MW 3 Earth Scene | Normal | Normal |
| 1327 | 52F | CrIS | 6 | MW 4 Earth Scene | Normal | Normal |
| 1328 | 530 | CrIS | 6 | MW 5 Earth Scene | Normal | Normal |
| 1329 | 531 | CrIS | 6 | MW 6 Earth Scene | Normal | Normal |
| 1330 | 532 | CrIS | 6 | MW 7 Earth Scene | Normal | Normal |
| 1331 | 533 | CrIS | 6 | MW 8 Earth Scene | Normal | Normal |
| 1332 | 534 | CrIS | 6 | MW 9 Earth Scene | Normal | Normal |
| 1333 | 535 | CrIS | 6 | SW 1 Earth Scene | Normal | Normal |
| 1334 | 536 | CrIS | 6 | SW 2 Earth Scene | Normal | Normal |
| 1335 | 537 | CrIS | 6 | SW 3 Earth Scene | Normal | Normal |
| 1336 | 538 | CrIS | 6 | SW 4 Earth Scene | Normal | Normal |
| 1337 | 539 | CrIS | 6 | SW 5 Earth Scene | Normal | Normal |
| 1338 | 53A | CrIS | 6 | SW 6 Earth Scene | Normal | Normal |
| 1339 | 53B | CrIS | 6 | SW 7 Earth Scene | Normal | Normal |
| 1340 | 53C | CrIS | 6 | SW 8 Earth Scene | Normal | Normal |
| 1341 | 53D | CrIS | 6 | SW 9 Earth Scene | Normal | Normal |
| 1342 | 53E | CrIS | 6 | LW 1 Deep Space | Normal | Normal |
| 1343 | 53F | CrIS | 6 | LW 2 Deep Space | Normal | Normal |
| 1344 | 540 | CrIS | 6 | LW 3 Deep Space | Normal | Normal |
| 1345 | 541 | CrIS | 6 | LW 4 Deep Space | Normal | Normal |
| 1346 | 542 | CrIS | 6 | LW 5 Deep Space | Normal | Normal |
| 1347 | 543 | CrIS | 6 | LW 6 Deep Space | Normal | Normal |
| 1348 | 544 | CrIS | 6 | LW 7 Deep Space | Normal | Normal |
| 1349 | 545 | CrIS | 6 | LW 8 Deep Space | Normal | Normal |
| 1350 | 546 | CrIS | 6 | LW 9 Deep Space | Normal | Normal |
| 1351 | 547 | CrIS | 6 | MW 1 Deep Space | Normal | Normal |
| 1352 | 548 | CrIS | 6 | MW 2 Deep Space | Normal | Normal |
| 1353 | 549 | CrIS | 6 | MW 3 Deep Space | Normal | Normal |
| 1354 | 54A | CrIS | 6 | MW 4 Deep Space | Normal | Normal |
| 1355 | 54B | CrIS | 6 | MW 5 Deep Space | Normal | Normal |
| 1356 | 54C | CrIS | 6 | MW 6 Deep Space | Normal | Normal |
| 1357 | 54D | CrIS | 6 | MW 7 Deep Space | Normal | Normal |
| 1358 | 54E | CrIS | 6 | MW 8 Deep Space | Normal | Normal |

| 1359 | 54F | CrIS | 6 | MW 9 Deep Space | Normal | Normal |
|------|-----|------|----|--------------------------|---------|--------|
| 1360 | 550 | CrIS | 6 | SW 1 Deep Space | Normal | Normal |
| 1361 | 551 | CrIS | 6 | SW 2 Deep Space | Normal | Normal |
| 1362 | 552 | CrIS | 6 | SW 3 Deep Space | Normal | Normal |
| 1363 | 553 | CrIS | 6 | SW 4 Deep Space | Normal | Normal |
| 1364 | 554 | CrIS | 6 | SW 5 Deep Space | Normal | Normal |
| 1365 | 555 | CrIS | 6 | SW 6 Deep Space | Normal | Normal |
| 1366 | 556 | CrIS | 6 | SW 7 Deep Space | Normal | Normal |
| 1367 | 557 | CrIS | 6 | SW 8 Deep Space | Normal | Normal |
| 1368 | 558 | CrIS | 6 | SW 9 Deep Space | Normal | Normal |
| 1369 | 559 | CrIS | 6 | LW 1 Internal Cal Target | Normal | Normal |
| 1370 | 55A | CrIS | 6 | LW 2 Internal Cal Target | Normal | Normal |
| 1371 | 55B | CrIS | 6 | LW 3 Internal Cal Target | Normal | Normal |
| 1372 | 55C | CrIS | 6 | LW 4 Internal Cal Target | Normal | Normal |
| 1373 | 55D | CrIS | 6 | LW 5 Internal Cal Target | Normal | Normal |
| 1374 | 55E | CrIS | 6 | LW 6 Internal Cal Target | Normal | Normal |
| 1375 | 55F | CrIS | 6 | LW 7 Internal Cal Target | Normal | Normal |
| 1376 | 560 | CrIS | 6 | LW 8 Internal Cal Target | Normal | Normal |
| 1377 | 561 | CrIS | 6 | LW 9 Internal Cal Target | Normal | Normal |
| 1378 | 562 | CrIS | 6 | MW 1 Internal Cal Target | Normal | Normal |
| 1379 | 563 | CrIS | 6 | MW 2 Internal Cal Target | Normal | Normal |
| 1380 | 564 | CrIS | 6 | MW 3 Internal Cal Target | Normal | Normal |
| 1381 | 565 | CrIS | 6 | MW 4 Internal Cal Target | Normal | Normal |
| 1382 | 566 | CrIS | 6 | MW 5 Internal Cal Target | Normal | Normal |
| 1383 | 567 | CrIS | 6 | MW 6 Internal Cal Target | Normal | Normal |
| 1384 | 568 | CrIS | 6 | MW 7 Internal Cal Target | Normal | Normal |
| 1385 | 569 | CrIS | 6 | MW 8 Internal Cal Target | Normal | Normal |
| 1386 | 56A | CrIS | 6 | MW 9 Internal Cal Target | Normal | Normal |
| 1387 | 56B | CrIS | 6 | SW 1 Internal Cal Target | Normal | Normal |
| 1388 | 56C | CrIS | 6 | SW 2 Internal Cal Target | Normal | Normal |
| 1389 | 56D | CrIS | 6 | SW 3 Internal Cal Target | Normal | Normal |
| 1390 | 56E | CrIS | 6 | SW 4 Internal Cal Target | Normal | Normal |
| 1391 | 56F | CrIS | 6 | SW 5 Internal Cal Target | Normal | Normal |
| 1392 | 570 | CrIS | 6 | SW 6 Internal Cal Target | Normal | Normal |
| 1393 | 571 | CrIS | 6 | SW 7 Internal Cal Target | Normal | Normal |
| 1394 | 572 | CrIS | 6 | SW 8 Internal Cal Target | Normal | Normal |
| 1395 | 573 | CrIS | 6 | SW 9 Internal Cal Target | Normal | Normal |
| 1397 | 575 | CrIS | 21 | Memory Dump | Special | None |
| 1398 | 576 | CrIS | 8 | Test | Special | None |

3.1.2 Mission Data Storage

The spacecraft's Solid State Recorder provides back-orbit storage of the SMD between ground station contacts. The SSR contains 343 gigabits of memory accommodating more than 3.5 orbits of SMD input at an orbital average rate of approximately 10 Mbps. The recorder has separate record and playback pointers and supports simultaneous recording and playback operations. All data stored on the SSR are Reed-Solomon encoded for error detection and correction prior to being recorded.

3.1.3 Mission Data Downlinking

The two separate X-band downlinks carrying the satellite's mission data to the ground originate from two separate spacecraft transmitters. The HRD is downlinked constantly to Direct Broadcast Users, while the SMD is downlinked as playback from the SSR during satellite contacts with the Norway ground station. Figure [3.1-1Figure 3.1-1 illustrates the NPP mission communications structure and the HRD and SMD links within that structure. Detailed information, including RF characteristics, may be found in the RF Interface Control Documents for HRD and SMD (refs. 2.1b and c) respectively.



3.1.4 HRD Fill Data

As mentioned, output to the HRD transmitter is at a constant 15 Mbps rate and fill data is added as needed to maintain that rate. The Fill Data is inserted at the Virtual Channel Data Unit (VCDU) level (Virtual Channel 63). Lower level (M_PDU and Packet level) formatting is not valid within the VCDU for Virtual Channel (VC) 63. VCDU data zone does not contain a M_PDU or a Source Packet, but the entire 886 octets contains the repeating pattern "0x0B" ("0b00001011").

3.2 OPERATIONAL MODES

3.2.1 Satellite Modes

A "mode" defines the operational status of the satellite with the spacecraft and instruments commanded to a specific configuration to perform required operations. During a specific mission phase, the satellite may be operated in more than one mode. The mode dictates a specific spacecraft state, but the spacecraft state does not dictate a specific satellite mode (i.e., the S/C may be in Point State to support Science Mode, but the instruments and supporting components must also be properly configured to support full Science Mode.) The mode requires the appropriate configuration of spacecraft state, components, and instrument operations.

The NPP satellite supports six (6) operational modes shown in Table 3.2.1 with mission data availability noted. Mission data are not available in Launch Mode. In Outgassing and Safe Modes, mission data collection depends on the instrument configuration.

| Launch Mode | Spacecraft attitude is not controlled |
|--------------------------|--|
| | Instruments are powered off with survival heaters enabled |
| | No Mission Data available |
| Science Mode | Spacecraft maintains fine attitude pointing/determination (Point State). |
| | Instruments are on, commanded to appropriate operational mode |
| | Mission data collected and stored on Solid State Recorder (SSR) |
| | Real-time Science data transmitted on High Rate Data link |
| | Playback Stored Mission Data transmitted on X-band link |
| Science Calibration Mode | Spacecraft performs special calibration maneuvers, including roll, yaw and |
| | pitch-over |
| | Spacecraft remains in Point State |
| | Instruments are on, commanded to appropriate operational mode |
| | Inst. calibration data collected and stored on SSR |
| | HRD is suspended when pointing constraints exist |
| Orbit Adjust Mode | Spacecraft is in Delta-V State |
| | Spacecraft nominally exits Delta-V to Point State (non-thruster based |
| | mode) |
| | Instrument modes controlled via ground or stored command |
| | Mission data collected and stored on SSR (but instruments may be safed) |
| | HRD may be suspended due to pointing constraints |
| Safe Modes | |
| Safehold/Mission Point | Spacecraft in Point State, maintaining fine pointing attitude (nadir target) |
| | Instruments safed, then payload buses shed |
| | No mission data; 16K R/T only |
| Safehold/Earth-Point | Spacecraft in Earth-Safe State, nadir pointing |
| | Instruments safed (if possible) |
| | There is no or limited mission data stored to SSR; |
| | HRD transmitter is off if payload bus is shed |
| Survival/Sun-Point | Spacecraft in Sun-Safe State, sun point attitude |

 Table 3.2.1 NPP Satellite Modes

| | Instruments safed (if possible), then all buses shed except Essential Bus No mission data; 1K R/T critical telemetry only | | |
|-----------------|--|--|--|
| Outgassing Mode | Spacecraft in Point or Earth-Safe State | | |
| | Instruments configured for outgassing or desired operational mode | | |
| | Mission data collected and stored on SSR when appropriate | | |

3.2.2 Instrument Operational Modes

The instrument modes of operation are configurable by ground or stored command or by autonomous command for fault situations. The Mission Management Center (MMC) configures instruments to a number of operational modes within a given satellite mode as required.

Table 3.2.2 shows the relationship between instrument modes and satellite modes.

| NPP Mode | FSW State | Inst. Bower | ATMS | CrIS | OMPS | VIIRS | CERES |
|-----------------------------------|----------------|----------------|---------------|------------------------|---------------|----------------------------|-----------------------------|
| | State | FOWEI | | | | | |
| Launch | Wait | Off | Survival | Survival | Survival | Survival/Launch | Off, Survival |
| Science | Point | On | Operational | Operational, Outgas | Operational | Operational, Outgassing | Science |
| Science | Point | On | Operational. | Operational | Operational. | Operational. | Science. |
| Calibration | | | Diagnostic | Diagnostic | Diagnostic | Diagnostic | Diagnostic |
| Orbit Adjust | Delta-V | On | Operational* | Operational* | Operational* | Operational* | Science* |
| SafeHold/ MPM | Point | Off | Survival | Survival | Survival | Survival | Off, Survival |
| SafeHold/ EPM (power fault) | Earth- Safe | Off | Survival | Survival | Survival | Survival | Off, Survival |
| SafeHold/ EPM | Earth- Safe | On | Safe-hold | Safe, Outgas | Safe Hold | Safe-hold, Outgassing | Off, Survival, Safe-Hold |
| (non-power fault) | | | | | | | |
| Survival/ SPM | Sun- Safe | Off | Off, Survival | Off, Survival | Off, Survival | Off, Survival, | Off, Survival |

Table 3.2.2 NPP Operational Modes and Instrument Modes

*NOTE- Instrument Mode during Orbit Adjust is at the instruments/operations team discretion. May remain Operational or be safed.

The instruments output mission data only when in their Operational and Diagnostic Modes. The CrIS outputs a subset of its mission data – engineering and calibration data but not science data – in its Outgas and Safe Modes. Thus, in NPP Science and Science Calibration Mode, all instruments gather mission data according to their mode. No mission data are generated when NPP is in its Launch Mode and the MPM and power fault EPM SafeHold Modes. All the instruments generate mission data when in Orbit Adjust Mode unless the flight operations team configures them to Safe Mode. During the Orbit Adjust Mode, the non-power fault EPM and Survival Safe Modes, the CrIS, in its Safe or Outgas Mode, will produce a subset of its mission data.

4.0 MISSION DATA FORMATS

4.1 ATMS

4.1.1 Introduction

The ATMS is a 22-channel millimeter-wave radiometer measuring upwelling radiances in six frequency bands centered at 23 GHz, 31 GHz, 50-58 GHz, 89 GHz, 166 GHz, and 183 GHz. The ATMS is a total-power radiometer, with "through-the-antenna" radiometric calibration. A pair of antenna apertures, scanned by rotating flat-plate reflectors, collects radiometric data. Scanning is performed cross-track to the satellite motion from sun to anti-sun, using the "integrate-while scan" type data collection. The scan period is 8/3 second, synchronized to the Cross-track Infrared Sounder (CrIS) using a spacecraft-provided scan synchronization pulse. The ATMS is compatible with both the NPP and NPOESS satellite architectures.

The primary roles of the ATMS are to obtain data during overcast conditions, to provide corrections for cloud effects in partly cloudy conditions, and to provide a "first-guess" for iterative physical retrievals. Processed mission data from the ATMS and the CrIS produce three of the NPP/NPOESS EDRs:

- Atmospheric Temperature Profiles
- Atmospheric Moisture Profiles
- Atmospheric Pressure Profiles

4.1.2 Instrument Function

The ATMS physical configuration consists of two major modular assemblies: an upper assembly and a lower assembly. The upper assembly includes the antenna, scan drive, and receiver components, mounted on a precision optical bench. The lower assembly contains the power supplies, scan drive electronics, and the signal processing electronics. It also provides the base plate for the spacecraft mechanical and thermal interface. The lower and upper assemblies are bolted and pinned together; pinning of the assemblies allows disassembly and reassembly without disturbing initial alignment. The lower assembly electronics boxes mount to the base plate, which provides the mechanical/thermal interface to the spacecraft.

The block diagram in Figure 4.1-1 shows the functional decomposition into subassemblies and the signal flow interfaces. Lower levels of block diagrams and circuitry descriptions are provided in the ATMS Instrument Functional Logic Diagrams (ref 2.2c).

The antenna subsystem provides the RF signals to the receiver, for both earth-viewing scene data and hot and cold calibration samples. The antenna subsystem includes the parabolic reflecting elements and feedhorns, which establish the antenna beam characteristics, and polarizing grids and diplexers, which multiplex the signals into six bands. The hot calibration targets --one for K, Ka and V-bands (KAV_WL) and one for W and G-band (WG_WL) -- and associated temperature sensors are also part of the antenna subsystem. The antenna pattern when viewing cold space establishes the cold calibration performance.

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The scan drive subsystem includes the Scan Drive Mechanism (SDM) and the Scan Drive Electronics (SDE). Telemetry from the SDM reports on the main motor, the compensation motor and resolver. The flat reflectors attached to the SDM have shrouds to ensure a stable thermal load for the hot calibration targets. The SDE performs the servo control functions according to a stored scan angle profile, which can be updated during the mission. The SDE receives scan pattern uploads and scan synchronization pulses from the Signal Processing Assembly (SPA), and provides boundary pulses at the beginning of each scan position to control data sampling and integration. It also provides angle position data for the center of each scan position.

The receiver subsystem amplifies and down-converts the radiometric RF signals from the antenna, and performs filtering and square-law detection of all 22 channels. The receiver subsystem is divided into four shelves: K/Ka-band, V-band, W-band and G-band – plus its own power supply. The shelf components are receiver front ends (RFE), local oscillators – an oven controlled crystal oscillator (OCXO), a cavity stabilized oscillator (CSO), a phase lock-loop oscillator (PLO or PLLO) and a Gunn Diode oscillator (GDO) – intermediate frequency (IF) modules, filters and square-law detectors in the video output units.

The video outputs of all channels are sent to the SPA in the electronics subsystem. The Video Digitizer (VD) performs analog multiplexing and digitization of the radiometric video signals. The housekeeping Circuit Card Assembly collects and digitizes housekeeping data from all of the ATMS subsystems. In conjunction with hosted flight software, the Digital Signal Processor (DSP) performs digital integration of the VD outputs over the sampling period, creates science and housekeeping data packets for communication to the spacecraft over the 1553B interface, processes commands received over this interface, and controls instrument operation.

The Power Distribution Assembly performs EMI filtering and transient suppression for the 28 V operational power. All electrical interfaces with the spacecraft (power, 1553B Command and Telemetry (C&T), pulse commands, and analog telemetry) are through the electronics subsystem.

The thermal control subsystem provides passive thermal control of the instrument with Multi-layered Insulation (MLI) blankets on exterior surfaces and efficient conductive coupling to the spacecraft cold plate. It also provides dual-redundant thermostatically-controlled survival heaters.





The design incorporates redundancy for all components of the electronics subsystem, the scan drive electronics, and the receiver power supply and local oscillators. Figure 4.1-2 illustrates these redundancies and the associated cross strapping between redundant components. Table 4.1.1 lists the eight possible redundancy configurations.



| CONFIG. | SPA PS | RECEIVER | SDE | SPA | SAW | |
|---------|--------|-------------------------------------|--------|-------|-------|--|
| | | SELECT | SELECT | CRUSS | CROSS | |
| 1 | A | REC A - PLO, CSO, GDO, RPS | SDE A | SPA A | SAW A | |
| 2 | | | | | SAW B | |
| 3 | | | | SPA B | SAW B | |
| 4 | | | | | SAW A | |
| 5 | в | REC B - PLO, CSO, GDO, | SDE B | SPA B | SAW B | |
| 6 | | | | | SAW A | |
| 7 | | | | SPA A | SAW A | |
| 8 | | RPS | | | SAW B | |

Table 4.1.1 ATMS Redundancy Configurations

Note: the antenna, Receiver, and SDM do not have redundancy so are not included in this table (See Figure 4.1-2).

The ATMS scanning geometry and corresponding angular velocity profile are illustrated in Figure 4.1-3. Every 8/3 second scan period is divided into 148 equal epochs of approximately 18 msec. During Operational mode, the radiometric signals are sampled for 96 Earth scene epochs, 4 cold calibration epochs and 4 hot calibration target epochs as shown in Figure 4.1-3. During Diagnostic mode, the scan profile can be commanded to change and the radiometric signals can be sampled at all 148 epochs.

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

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Figure 4.1-3 ATMS Operational Scan Pattern

4.1.3 Modes and Packet Structure

The ATMS instrument implements the following modes of operation:

- Off/Survival Mode
- Operational Mode
- Diagnostic Mode
- Safe Hold Mode

The functionality of the four instrument modes, and methods for executing transitions, are shown in Figure 4.1-4.

The ATMS outputs several packets relating to Mission Data: the Science packet, the Calibration packet, two types of Engineering packets, Memory Dump and Diagnostic packets. These packets unique to Mission data are not output in Off/Survival and Safe Hold Modes. The telemetry types, APID assignments and packet size for the ATMS mission data are listed in Table 4.1.2 with data rate by the ATMS mode.

| VC | APID ₁₀ | Telemetry Packet | Data Rate (bps) by Mode | | Downlink | | Packet |
|----|--------------------|---|-------------------------|---------------------|--------------|--------------|----------|
| U | Name | | Operational | Diagnostic | HRD | SMD | (octets) |
| 0 | 512 | Command Status, Note 1 | Note 1 | Note 1 | \checkmark | | Note 1 |
| 0 | 513 | LEO&A, Note 1 | Note 1 | Note 1 | \checkmark | \checkmark | Note 1 |
| 1 | 515 | Calibration | 444 | 444 | \checkmark | \checkmark | 444 |
| 3 | 516 | Diagnostic | | 622 | | \checkmark | 622 |
| 21 | 517 | Dwell | | 936 | | \checkmark | 312 |
| 0 | 518 | Housekeeping, Note 1 | Note 1 | Note 1 | \checkmark | ~ | Note 1 |
| 1 | 528 | Science | 19,344 | 19,344 | \checkmark | \checkmark | 62 |
| 3 | 536 | Science (Point and Stare or Continuous Sampling) (Note 2) | - | 19,344 or 27,528 | | ~ | 62 |
| 1 | 530 | Engineering – Hot Cal Temps | 144 | 144 | \checkmark | ~ | 48 |
| 1 | 531 | Engineering – Health and Status | 162 | 162 | \checkmark | ~ | 162 |
| 21 | 524 | Memory Dump | P - | variable | | \checkmark | <= 1024 |
| 0 | 543 | Hardware Error Status, Note 1 | Note 1 | Note 1 | \checkmark | ~ | Note 1 |
| 3 | 514 | Test, Note 1 | | 24,576 Note 3 | | ~ | 256 |

 Table 4.1.2 ATMS Mission Data Packet Types

1. Documented in the NPP Command & Telemetry Handbook

2. APIDs 528 and 536 are never output simultaneously. See the ATMS Science Data Section for further details.

3. The test packet data rate is determined by the spacecraft polling rate, not by the ATMS scan rate as data rates for other ATMS packets are.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.



Figure 4.1-4 ATMS Modes and Mode Transitions

Off/Survival Mode

In the Off or Survival mode, no primary power is supplied to the instrument. In Survival Mode, power is, however, available on the Survival Heater bus, enabling operation of survival heaters if needed. No mission data is output in Off or Survival Mode.

Operational Mode

In OPERATIONAL mode, the ATMS executes the earth-view scanning profile. Science data are output in APID 528. The ATMS generates calibration data during each scan period and also performs Continuous Built-In Tests (CBITs) that monitor and verify performance. The ATMS data consist of brightness temperatures and housekeeping data. The housekeeping and engineering data provides information for verifying instrument health and status and to support mission data processing. Software memory loads and dumps can be performed in Operational Mode.

Diagnostic Mode

Diagnostic "mode" is not established by a unique "mode" command. The ATMS enters Diagnostic mode when commanded to Continuous Sampling, Dwell or Point and Stare or to output the Diagnostic or Memory Dump Packets. The ATMS continues to output Science (in APID 536), Calibration and Engineering packets. If commanded to Continuous Sampling or Point and Stare, the Science data is output in APID 536 instead of APID 528; otherwise it continues to be output in APID 528. The <u>ATMS Instrument</u> <u>Operation and Maintenance Manual</u> describes the sensor's built-in diagnostic tests. Several tests can be initiated to determine the state of the instrument or sources of error in the following sub-modes.

4.1.3.1.1 Telemetry Dwell

The ATMS has the capability for high-rate sampling (55.5 Hz maximum) of selected housekeeping telemetry channels. When this function is commanded, the ATMS samples one of the housekeeping telemetry parameters, selected by command, at the same rate as a radiometric signal channel. The telemetry dwell data packet carries this

data. It may be used to isolate noise sources due to supply voltage EMI or intermittencies.

4.1.3.1.2 Point and Stare

In the Diagnostic Mode, the ATMS Instrument can point the antenna beams to any commanded beam position. The commanded position is maintained until a new pointing or scanning command is received.

Safe Hold

In the event of a serious spacecraft or instrument anomaly, the instrument may be commanded to enter the SAFE-HOLD mode to minimize power consumption. Transition to Safe Hold also occurs autonomously when programmable limits are exceeded on a safety-critical telemetry parameter or when the instrument does not receive 12 or more consecutive time-of-day messages.

No mission data are output in Safe Mode. The ATMS communicates with the spacecraft via the C&T bus to provide health and status data.

4.1.4 Mission Data

The ATMS telemetry transferred via the MIL-STD-1553B bus consists of data packets in the Consultative Committee for Space Data Systems (CCSDS) Path Protocol Data Unit format described in ref. 2.2m. Each packet has a primary header containing three 16-bit words (one 16-bit word = 2 octets) and a secondary header containing a 64-bit UTC time code. The only exceptions are not mission data. The LEO&A and Test packets do not contain the time code. All fields in the ATMS data packets are big endian.

The secondary header contains the Universal Time Code (UTC). The UTC contains 4 words (8 octets) and represents the time accurate to 1 μ sec. The format of the UTC is provided in Table 4.1.3.

For science packets, the time tag indicates the time of the boundary pulse following the included data. For all other packets the UTC time represents the time of the oldest sample of the collection. Since data values are sampled in the order they appear in the packet, Housekeeping, Dwell and the Engineering packet's UTC time refers to the time of the first data value. The UTC times are calculated from the last second's UTC time plus the time difference in microseconds between the sample's 24 bit time value and the 24 bit timestamp register value for the one second time.

| Time Code Format | | | | | | |
|------------------|---------------------------|-----------------|--------------|--|--|--|
| Bits | 0 to 15 | 16 to 47 | 48 to 63 | | | |
| Parameter | Day | msec of Day | µsec of msec | | | |
| Range of Values | 0 to (2 ¹⁶ -1) | 0 to 86,399,999 | 0 to 999 | | | |

| Table 4.1.3 | NPP | Universal | Time | Code | Format |
|-------------|-----|-----------|------|------|--------|
|-------------|-----|-----------|------|------|--------|

The ATMS uses three types of temperature monitoring:

• Temperature of the instrument mounting interface, monitored by the spacecraft, and reported in spacecraft telemetry.
- Passive Analog Temperature (PAT) sensors within the instrument, powered by the spacecraft. The signals are processed by the spacecraft and reported in spacecraft telemetry. The ATMS instrument uses five redundant PAT sensors.
- · Platinum resistance temperature sensors (PRTs) within the instrument, processed by the instrument, and digitized for inclusion in the ATMS Housekeeping and Engineering data packets.

Unique coefficients for each PRT based on the manufacturer's data are required to determine the temperature. The signal from each PRT is digitized via an A-to-D converter aboard the ATMS instrument, providing a count from 0 to 65,535 representing the resistance of a given PRT. The count to resistance relationship is given by the following equation:

$$R = \frac{\gamma_R}{\gamma_1 - \gamma_0} [C - \gamma_0] - R_c \tag{1}$$

Where:

C = number of counts measured for the PRT R_c = resistance of cable to the PRT (applicable only to 2 wire PRTs) $\gamma_{\rm R}$, γ_0 , and γ_1 are parameters defined in Table 4.1.4.

and

| Parameter | 4-Wire PRTs | 2-Wire PRTs |
|-----------|---|--|
| ŶR | PAM resistance (word 1 or 2 of Calibration Data Packet) | Housekeeping reference resistance = MUXREST1_A, MUXREST2_A, MUXREST1_B, MUXREST2_B (words 212 – 215 of Calibration Data Packet) |
| Yo | 4W_GND_A or _B (word 46 of Hkpg and Engr Data Packet) | 2W_GND_A or _B (word 47 of Hkpg and Engr Data Packet) |
| | KV_WL_4WRES or WG_WL_4WRES (word 9 or 17 of Eng-HotCal Temperatures Data Packet) | [HK_2WREST1_A, HK_2WREST2_A] or, [HK_2WREST1_B, HK_2WREST2_B] (words 44 and 45 of HK and Engr Data Packets) |

Table 4.1.4 ATMS PRT Parameters

After computing the resistance, R, the Callendar-Van Dusen equation is then used to determine the physical temperature of each PRT. The equation is given below:

$$R = R_0 \left[1 + \alpha \left(T - \delta \left(\frac{T}{100} - 1 \right) \left(\frac{T}{100} \right) - \beta \left(\frac{T}{100} - 1 \right) \left(\frac{T}{100} \right)^3 \right) \right]$$
(2)

Where:

- T = physical temperature of the PRT
- R = resistance (ohms) of the PRT (from equation 1)
- R_{o} = resistance at ice point of the PRT (supplied by PRT vendor)
- α , δ , β = constants measured for the PRT (supplied by PRT vendor)

The Newton-Raphson technique is used to perform the inversion, to compute T for a given R.

4-Wire PRTs

The 4-wire PRTs measure the temperature of the ATMS calibration loads. This information is needed in SDR processing, so temperature measurements are in the Engineering--Hot Cal Temps Packet. To support the processing of the 4-wire PRTs as described above, the following coefficients are provided in data words 3-62 of the Calibration Data Packet: R_0 , α , δ , β .

Receiver Shelf 2-Wire PRTs

All 2-wire PRTs assess the health and status of the instrument. They are not needed in producing SDRs, so measurements are included in the Engineering—Health and Status Packet.

Processing of the receiver shelf 2-wire PRTs is identical to the 4-wire PRT processing, except that β is assumed to be 0 and is not transmitted as part of the calibration data packet for those sensors. R₀, α , and δ are provided in words 140-155 of the Calibration Data Packet. The cable resistance, Rc, is also provided, for use in the counts-to-resistance conversion (equation 1).

Other 2-Wire PRTs

Other 2-wire PRTs are used purely as health and status indicators and do not require the same precision as the 4-wire and receiver shelf PRTs. These temperatures, therefore, are processed according to the following linear equation, except for the scan drive PRTs:

$$T = A_{1}(R - R_{0}) = A_{1}(R' - R'_{0})$$

$$R' = R + R_{C} = \frac{\gamma_{R}}{\gamma_{1} - \gamma_{0}} [C - \gamma_{0}]$$

$$R'_{0} = R_{0} + R_{C}$$
(3)

where

T is the temperature, in degrees C,

 R'_0 and A_1 are parameters transmitted in the Calibration Data Packet, words 156-211

The parameter A_1 is related to the Calendar-Van Dusen parameters by the following equation:

$$A_1 = \frac{1}{\alpha(1+\delta/100)R_0}$$

The scan drive PRTs (words #40 and 41 of the housekeeping packet) are processed using the equation defined in the conversion coefficient column of Table 4.1.8.

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Science Data

The ATMS Science Data packets (APIDs 528 and 536) contain scan angle counts, error status flags (see Table 4.1.5 below), and radiometric counts for channels 1 through 22 at a single scan position. The operational mode science packet (APID 528) is output for 104 positions every scan (96 Earth scene positions, 4 cold calibration and 4 hot calibration positions). Since the scan duration is 8/3 seconds, the operational data rate is19,344 bps. In diagnostic mode, the science packet (APID 536) may be output 104 times every 8/3 seconds if the ATMS is in Point and Stare mode without Continuous Sampling enabled or may be generated approximately every 18 milliseconds if Continuous Sampling is enabled, thereby increasing the downlink rate to 27,528 bps.

The science packets contain a secondary header with a time tag indicating the time of the boundary pulse that follows the included data. For the scan angle value the full 16-bit range corresponds to 360 degrees, which means the scale factor is 5.493x10⁻³ degrees per count. The packet length is fixed at 62 octets. The structure of APID 528 is illustrated in Figure 4.1-5 and the user data fields are listed in Table 4.1.5.

| cien | ce Data Pa | cket Format | | | | | Fixed Pack | et Length 62 | Octets | VERSION | c | | DATE: 8/1/2004 | |
|-------------|--|-------------------|-----------------|-----------------|----------------------------------|----------------------------------|------------------|--------------|------------------------------|--------------------------|-------------------------------------|-------------------------------------|------------------------------------|--------------------------------------|
| r | | | 530 | WEE DETWOOM HER | DED | | <u> </u> | SECONDARY | 1 | | | User Data | Field | |
| ľ | Verson No. | Pac | ket Identi | fication | Packet Contro | Sequence 1 (PSC) | Packet Length | HEADER | | | | ATM | S Science Data | |
| | | Type Indicator | Sec Hdr Flag | APID | Sequence Flags | Sequence Count | | End of Scan | ATMS Scan Angle Counts | Error Status Flags | Channel 1 Radiometri c Counts | Channel 2 Radiometri c Counts | Channel 3-21 Radiometric Counts | Channel 22 Radiometri c Counts |
| Bits | 3 | 1 | 1 | 11 | 2 | 14 | 16 | 64 | 16 | 16 | 16 | 16 | 304 | 16 |
| tets | | | 2 | | | 2 | 2 | 8 | 2 | 2 | 2 | 2 | 38 | 2 |
| 0 P 1 | = Telemetry acket = Secondary leader Preser | | | | 0x210 during (0x218 during [| Operational Mo Diagnostic Moo | ode de | \searrow | CCSDS Day Segmented | | | | | |
| | | | BA | | Figure | 4.1-5 A | TMS S | cience D |)ata Pac | cket Fo | ormat | | | |

| | Dia. | | | Units | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | |
|-----------|------|---------------|--|-------------|--|-----------|
| Start Bit | Bit | Mnemonic Name | Description | OR | OR | Data Type |
| | Size | | | State Value | State Name | |
| 0 | 16 | N/A | Scan Angle Counts | degrees | 5 403E 3 0 4008812 | |
| 16 | 16 | N/A | | N/A | Ν/Δ | |
| 10 | 10 | N/A | | 0 | Any other scan position | 0 |
| 16 | 1 | N/A | ESE Start of Scap Synchronization Bit | 1 | Start of Scan position | |
| 10 | 1 | N/A | EST == Start of Scart | NZA | N/A | N/A |
| 17 | | IN/A | | 01 | | 19/7 |
| | | | | 10 | TOD Pulse | |
| 10 | 2 | N/A | | 11 | Roundony Dulco | Б |
| 10 | 2 | IN/A | | 0 | No SDE Dority Error | D |
| 20 | 1 | N/A | ESE SDE Data Parity Error | 1 | SDE Parity Error Present | B |
| 20 | | IN/A | | 0 | No parity Error | D |
| 24 | 4 | NI/A | ESE SDE Talametr/Wander Darity Error | 1 | No parity Error | в |
| 21 | | N/A | ESF SDE Telefineti ýrneadel Panty Errol | | 9-bit fielder has parity endi | Б |
| 22 | 4 | NI/A | ESE Deflector Depition Available | 1 | SDE Desition Data Available | в |
| 22 | | N/A | | | SDE POSITION Data Not Available | Б |
| | | | | 1 | No Timesut Error Occurred | |
| | | N 1/A | | · · | No Timeout Error Occurred | |
| 23 | 1 | N/A | ESF SDE command transmit time Out | 51/3 | | В |
| 24 | 8 | N/A | ESF Telemetry/Header Code from SDE | N/A | N/A | 0 |
| 32 | 16 | N/A | Ch 1_Radiometric Counts | N/A | N/A | 0 |
| 48 | 10 | N/A | | N/A | N/A | 0 |
| 64 | 10 | N/A | Ch 3_Radiometric Counts | N/A | N/A | 0 |
| 80 | 16 | N/A | Ch 4_Radiometric Counts | N/A | N/A | 0 |
| 96 | 16 | N/A | Ch 5_Radiometric Counts | N/A | N/A | 0 |
| 112 | 16 | N/A | Ch & Radiometric Counts | N/A | N/A | 0 |
| 128 | 16 | N/A | Ch /_Radiometric Counts | N/A | N/A | 0 |
| 144 | 16 | N/A | Cn 8_Radiometric Counts | N/A | N/A | 0 |
| 160 | 16 | N/A | Cn 9_Radiometric Counts | N/A | N/A | 0 |
| 1/6 | 16 | N/A | Ch 10_Radiometric Counts | N/A | N/A | 0 |
| 192 | 16 | N/A | Ch 11_Radiometric Counts | N/A | N/A | U |
| 208 | 16 | N/A | Ch 12_Radiometric Counts | N/A | N/A | U |
| 224 | 16 | N/A | Ch 13_Radiometric Counts | N/A | N/A | U |
| 240 | 16 | N/A | Ch 14_Radiometric Counts | N/A | N/A | U |
| 256 | 16 | N/A | | N/A | N/A | 0 |
| 272 | 16 | N/A | Ch 16_Radiometric Counts | N/A | N/A | U |
| 288 | 16 | N/A | Ch 17_Radiometric Counts | N/A | N/A | U |
| 304 | 16 | N/A | Ch 18 Radiometric Counts | N/A | N/A | U |
| 320 | 16 | N/A | Ch 19_Radiometric Counts | N/A | N/A | U |
| 336 | 16 | N/A | Ch 20_Radiometric Counts | N/A | N/A | 0 |
| 352 | 16 | N/A | Ch 21_Radiometric Counts | N/A | N/A | 0 |
| 368 | 16 | N/A | Ch 22_Radiometric Counts | N/A | N/A | U |
| | | | RHI CHOILE | | | |
| | | | | | | |

Table 4.1.5 ATMS Science Packet User Data Fields

Calibration Data

The ATMS Calibration Packet (APID 515) contains constants unique to each ATMS unit necessary to process the mission and housekeeping data. The parameters calibrate the receiver outputs, temperature sensors and the optical alignment of the sensor. See Section 4.1.4 for more information on PRT temperature sensors.

. are list



Figure 4.1-6 ATMS Calibration Packet Format

NOTES

- 1) For 4-wire PRTs, "*" represents the four PRT parameters -- "R0", "alpha", "delta" and "beta", for every numbered PRT (2 to 8 in K, Ka and V), (1 to 7 in W and G)
- 2) For alignment data, "**" represents the position, either 01, 48 or 96, and "?" represents the axis, X, Y or Z.
- 3) For Shelf PRTs, "***" represents three PRT parameters and the cable resistance -- "R0", "alpha", "delta" and "RC".
- 4) For 2-wire PRTs, "****" represents the two PRT parameters, "R0" and "A1".

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

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| Table 4.1.6 | ATMS Calibration | Packet User | Data Fields |
|-------------|-------------------------|-------------|-------------|
|-------------|-------------------------|-------------|-------------|

| | Bit | | | Units | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | |
|-----------|------|--------------|--|-----------------------|--|-----------|
| Start Bit | Size | Memonic Name | Description | OR State Value | OR State Name | Data Type |
| 0 | 16 | N/A | K, Ka and V band Passive Analog Monitor resistance | Ohms | -, -, -, 0.006, 2300 | U |
| 16 | 16 | N/A | W and G band Passive Analog Monitor resistance | Ohms | -, -, -, -, 0.006, 2300 | U |
| 32 | 16 | N/A | K, Ka and V-band Cal Target temperature #1, parameter R0 4-W PRT_KAV_1_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 48 | 16 | N/A | K, Ka and V-band Cal Target temperature #1, parameter alpha 4-W PRT_KAV_1_alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | U |
| 64 | 16 | N/A | K, Ka and V-band Cal Target temperature #1, parameter delta 4-W PRT_KAV_1_delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 80 | 16 | N/A | K, Ka and V-band Cal Target temperature #1, parameter beta 4-W PRT_KAV_1_beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 96 | 16 | N/A | K, Ka and V-band Cal Target temperature #2, parameter R0 4-W PRT_KAV_2_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 112 | 16 | N/A | K, Ka and V-band Cal Target temperature #2, parameter alpha 4-W PRT_KAV_2_ alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | U |
| 128 | 16 | N/A | K, Ka and V-band Cal Target temperature #2, parameter delta 4-W PRT_KAV_2_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 144 | 16 | N/A | K, Ka and V-band Cal Target temperature #2, parameter beta 4-W PRT_KAV_2_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 160 | 16 | N/A | K, Ka and V-band Cal Target temperature #3, parameter R0 4-W PRT_KAV_3_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 176 | 16 | N/A | K, Ka and V-band Cal Target temperature #3, parameter alpha 4-W PRT_KAV_3_ alpha | Celsius | -, -, -, 5.0E-8, 0.0020 | U |
| 192 | 16 | N/A | K, Ka and V-band Cal Target temperature #3, parameter delta 4-W PRT_KAV_3_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 208 | 16 | N/A | K, Ka and V-band Cal Target temperature #3, parameter beta 4-W PRT_KAV_3_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 224 | 16 | N/A | K, Ka and V-band Cal Target temperature #4, parameter R0 4-W PRT_KAV_4_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 240 | 16 | N/A | K, Ka and V-band Cal Target temperature #4, parameter alpha 4-W PRT_KAV_4_ alpha | Celsius ' | -, -, -, 5.0E-8, 0.0020 | U |
| 256 | 16 | N/A | K, Ka and V-band Cal Target temperature #4, parameter delta 4-W PRT_KAV_4_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 272 | 16 | N/A | K, Ka and V-band Cal Target temperature #4, parameter beta 4-W PRT_KAV_4_beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 288 | 16 | N/A | K, Ka and V-band Cal Target temperature #5, parameter R0 4-W PRT_KAV_5_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 304 | 16 | N/A | K, Ka and V-band Cal Target temperature #5, parameter alpha 4-W PRT_KAV_5_ alpha | Celsius [*] | -, -, -, 5.0E-8, 0.0020 | U |
| 320 | 16 | N/A | K, Ka and V-band Cal Target temperature #5, parameter delta 4-W PRT_KAV_5_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 336 | 16 | N/A | K, Ka and V-band Cal Target temperature #5, parameter beta 4-W PRT_KAV_5_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 352 | 16 | N/A | K, Ka and V-band Cal Target temperature #6, parameter R0 4-W PRT_KAV_6_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 368 | 16 | N/A | K, Ka and V-band Cal Target temperature #6, parameter alpha 4-W PRT_KAV_6_ alpha | Celsius | -, -, -, 5.0E-8, 0.0020 | U |
| 384 | 16 | N/A | K, Ka and V-band Cal Target temperature #6, parameter delta 4-W PRT_KAV_6_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 400 | 16 | N/A | K, Ka and V-band Cal Target temperature #6, parameter beta 4-W PRT_KAV_6_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 416 | 16 | N/A | K, Ka and V-band Cal Target temperature #7, parameter R0 4-W PRT_KAV_7_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 432 | 16 | N/A | K, Ka and V-band Cal Target temperature #7, parameter_alpha 4-W PRT_KAV_7_ alpha | Celsius ⁻¹ | -, -, -, 5.0E-8, 0.0020 | U |
| 448 | 16 | N/A | K, Ka and V-band Cal Target temperature #7, parameter_delta 4-W PRT_KAV_7_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 464 | 16 | N/A | K, Ka and V-band Cal Target temperature #7, parameter beta 4-W PRT_KAV_7_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 480 | 16 | N/A | K, Ka and V-band Cal Target temperature #8, parameter R0 4-W PRT KAV 8 R0 | Ohms | 0.003. 1900 | U |
| 496 | 16 | N/A | K, Ka and V-band Cal Target temperature #8, parameter_alpha 4-W PRT_KAV_8_alpha | Celsius" | 5.0E-8. 0.0020 | U |
| 512 | 16 | N/A | K, Ka and V-band Cal Target temperature #8, parameter delta 4-W PRT KAV 8 delta | Celsius | 5.0E-5. 0.0 | U |
| 528 | 16 | N/A | K, Ka and V-band Cal Target temperature #8, parameter beta 4-W PRT_KAV_8_ beta | Celsius | -, -, -, 6.0E-5, -2.0 | U |
| 544 | 16 | N/A | W and G-band Cal Target temperature #1, parameter R0 4-W PRT_WG_1_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 560 | 16 | N/A | W and G-band Cal Target temperature #1, parameter alpha 4-W PRT_WG_1_ alpha | Celsius [*] | -, -, -, 5.0E-8, 0.0020 | U |
| 576 | 16 | N/A | W and G-band Cal Target temperature #1, parameter delta 4-W PRT_WG_1_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 592 | 16 | N/A | W and G-band Cal Target temperature #1, parameter beta 4-W PRT_WG_1_ beta | Celsius | -, -, -, 6.0E-5, -2.0 | U |
| 608 | 16 | N/A | W and G-band Cal Target temperature #2, parameter R0 4-W PRT_WG_2_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 624 | 16 | N/A | W and G-band Cal Target temperature #2, parameter alpha 4-W PRT_WG_2_ alpha | Celsius [*] | -, -, -, 5.0E-8, 0.0020 | U |
| 640 | 16 | N/A | W and G-band Cal Target temperature #2, parameter delta 4-W PRT_WG_2_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 656 | 16 | N/A | W and G-band Cal Target temperature #2, parameter beta 4-W PRT_WG_2_ beta | Celsius | -, -, -, 6.0E-5, -2.0 | U |
| 672 | 16 | N/A | W and G-band Cal Target temperature #3, parameter R0 4-W PRT_WG_3_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 688 | 16 | N/A | W and G-band Cal Target temperature #3, parameter alpha 4-W PRT_WG_3_ alpha | Celsius | -, -, -, 5.0E-8, 0.0020 | U |
| | | | o HILCHOL | | | |
| | | | Mr. | | | |

| Table 4.1.6 | ATMS Calibration | Packet User | Data Fields | (cont) |
|-------------|------------------|--------------------|--------------------|--------|
|-------------|------------------|--------------------|--------------------|--------|

| Bit | | | Units | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | |
|------|---|---|--|---|--|
| Size | Memonic Name | Description | OR State Value | OR State Name | Data Type |
| 16 | N/A | W and G-band Cal Target temperature #3, parameter delta 4-W PRT_WG_3_ delta | Celsius | -, -, -, 5.0E-5, 0.0 | U |
| 16 | N/A | W and G-band Cal Target temperature #3, parameter beta 4-W PRT_WG_3_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 16 | N/A | W and G-band Cal Target temperature #4, parameter R0 4-W PRT_WG_4_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 16 | N/A | W and G-band Cal Target temperature #4, parameter alpha 4-W PRT_WG_4_ alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | U |
| 16 | N/A | W and G-band Cal Target temperature #4, parameter delta 4-W PRT_WG_4_delta | Celsius | -, -, -, -, 5.0E-5, 0.0 | U |
| 16 | N/A | W and G-band Cal Target temperature #4, parameter beta 4-W PRT_WG_4_ beta | Celsius | -, -, -, -, 6.0E-5, -2.0 | U |
| 16 | N/A | W and G-band Cal Target temperature #5, parameter R0 4-W PRT_WG_5_R0 | Ohms | -, -, -, -, 0.003, 1900 | U |
| 16 | N/A | W and G-band Cal Target temperature #5, parameter alpha 4-W PRT_WG_5_ alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | 0 |
| 10 | N/A | W and G-band Cal Target temperature #5, parameter delta 4-W PKT_WG_5_ delta | Celsius | -, -, -, -, 5.0E-5, 0.0 | 0 |
| 10 | N/A | W and G-band Call ranget temperature #6 parameter Beta 4-W FK1_WG | Ohmo | -, -, -, -, 6.0E-5, -2.0 | 0 |
| 10 | N/A | W and G-band Cal rarget temperature #6, parameter along | Coleiue | -, -, -, -, 0.003, 1900 | 0 |
| 16 | N/A | W and G-band Cal Target temperature #6 parameter delta 4-W PRT WG_6 delta | Celsius | -, -, -, 5.0E-6, 0.0020 | Ŭ |
| 16 | N/A | W and G-band Cal Target temperature #6 parameter beta 4-W PRT WG 6 beta | Celsius | -, -, -, -, <u>-</u> , <u>-</u> , <u>0.0</u> | ŭ |
| 16 | N/A | W and G-band Cal Target temperature #7. parameter R0 4-W PRT WG 7 R0 | Ohms | 0.003 1900 | Ŭ |
| 16 | N/A | W and G-band Cal Target temperature #7, parameter alpha 4-W PRT WG 7 alpha | Celsius | 5.0E-8. 0.0020 | Ū |
| 16 | N/A | W and G-band Cal Target temperature #7, parameter delta 4-W PRT WG 7 delta | Celsius | 5.0E-5. 0.0 | U |
| 16 | N/A | W and G-band Cal Target temperature #7, parameter beta 4-W PRT WG 7 beta | Celsius | -, -, -, 6.0E-5, -2.0 | U |
| 16 | N/A | K band Cal Target Offset | Celsius | 7.5E-6. 0.0 | U |
| 16 | N/A | KA band Cal Tarret Offset | Celsius | 7.5E-6 0.0 | ū |
| 16 | NIA | V band Cal Target Offset | Colcius | 7556 00 | <u> </u> |
| 10 | N/A | When a larger offset | Celaiua | -, -, -, -, -7.5E-0, 0.0 | |
| 10 | N/A | w band car larget Oriset | Celsius | -, -, -, -, -7.5E-6, 0.0 | 0 |
| 16 | N/A | G band Cal Target Offset | Celsius | -, -, -, -/.5E-6, U.U | U |
| 16 | N/A | K band Cold Calibration Offset | Celsius | -, -, -, 1.5E-5, 0.0 | U |
| 16 | N/A | KA band Cold Calibration Offset | Celsius | -, -, -, -, 1.5E-5, 0.0 | U |
| 16 | N/A | V band Cold Calibration Offset | Celsius | -, -, -, 1.5E-5, 0.0 | U |
| 16 | N/A | W band Cold Calibration Offset | Celsius | -, -, -, 1.5E-5, 0.0 | U |
| 16 | N/A | G band Cold Calibration Offset | Celsius | -, -, -, 1.5E-5, 0.0 | U |
| 16 | N/A | Quadratic Coefficient at Chan 1 | Kelvin | 2.6E-50.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 2 | Kelvin | 26E-5 -0850 | Ū |
| 16 | N/A | | Kolvin | 2 6E 5 0 850 | |
| 10 | NIA | | Kelvin | 2.65 5 0.850 | |
| 10 | N/A | | Kelvin | -, -, -, -, 2.82-5, -0.850 | 0 |
| 16 | N/A | Quadratic Coefficient at Chan 5 | Keivin | -, -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 6 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 7 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 8 | Kelvin | -, -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 9 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 10 | Kelvin | -, -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 11 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 12 | Kelvin | 2.6E-50.850 | U |
| 16 | N/A | Quadratic Coefficient at Chan 13 | Kelvin | 26E-5 -0850 | Ū |
| 16 | N/A | Quadratic Coefficient at Chan 14 | Kelvin | 26E-5 -0.850 | ů U |
| 10 | N/A | | Kelvin | -, -, -, 2.02-3, -0.030 | 0 |
| 10 | N/A | | Kelvin | -, -, -, -, 2.82-5, -0.850 | 0 |
| 16 | N/A | | Keivin | -, -, -, -, 2.6E-5, -U.85U | U |
| 16 | N/A | Quadratic Coefficient at Chan 16 | Kelvin | -, -, -, -, 2.6E-5, -0.850 | U |
| | Bit Size 16 16 16 16 16 16 16 16 16 16 16 16 16 | Bit Size Memonic Name 16 N/A 16 N/A | Bit Memonic Name Description 19 NA Wand C-band Cal Target Imperature 8.7, parameter 280 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 280 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 280 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 201 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 201 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 19 NA Wand C-band Cal Target Imperature 8.7, parameter 401 - 4.77 PKT, WG, 5, 0.616, 1.767 | Bit Memonic Name Discription Units Of State Value 16 NA Wand G-band Call Target temperature 45, parameter Jobs - 44V PRT, VG, 3, data Celsus 16 NA Wand G-band Call Target temperature 45, parameter Jobs - 44V PRT, VG, 3, data Celsus 16 NA Wand G-band Call Target temperature 45, parameter Jobs - 44V PRT, VG, 3, data Celsus 16 NA Wand G-band Call Target temperature 44, parameter Isols - 44V PRT, VG, 4, data Celsus 16 NA Wand G-band Call Target temperature 44, parameter Isols - 44V PRT, VG, 4, data Celsus 16 NA Wand G-band Call Target temperature 46, parameter Isols - 44V PRT, VG, 5, dot Celsus 16 NA Wand G-band Call Target temperature 45, parameter Isols - 44V PRT, VG, 5, dot Celsus 16 NA Wand G-band Call Target temperature 45, parameter Isols - 44V PRT, VG, 5, dot Celsus 16 NA Wand G-band Call Target temperature 45, parameter Isols - 44V PRT, VG, 5, dot Celsus 16 NA Wand G-band Call Target temperature 45, parameter Isols - 44V PRT, VG, 7, dot Celsus 16 NA Wand G-band Call Target temperature 47, parameter Isols - 44V PR | Bit Percent hare Despin Concentral elements of a parabolish parabolish of a parabolish parabolish of a parabolish pa |

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| | Dit | | | Units | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | |
|-----------|------|--------------|--|-------------|--|-----------|
| Start Bit | DIL | Memonic Name | Description | OR | OR | Data Type |
| | Size | | | State Value | State Name | |
| 1408 | 16 | N/A | Quadratic Coefficient at Chan 17 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 1424 | 16 | N/A | Quadratic Coefficient at Chan 18 | Kelvin | -, -, -, 2.6E-5, -0.850 | U |
| 1440 | 16 | N/A | Quadratic Coefficient at Chan 19 | Kelvin | -, -, -, -, 2.6E-5, -0.850 | U |
| 1456 | 16 | N/A | Quadratic Coefficient at Chan 20 | Kelvin | 2.6E-50.850 | U |
| 1472 | 16 | N/A | Quadratic Coefficient at Chan 21 | Kelvin | 26E-5 -0.850 | U |
| 1488 | 16 | N/A | Quadratic Coefficient at Chan 22 | Kelvin | 2.6E-5 -0.850 | Ŭ |
| 1504 | 16 | N/A | K band alignment 01 at X axis Alignment K 01 X | Degrees | -, -, -, -, 2.0E-5, -0.655 | Ū |
| 1520 | 16 | N/A | K band Alignment 01 at Y axis Alignment K 01 Y | Degrees | 20E-5 -0.655 | Ū |
| 1536 | 16 | N/A | K band Alignment 01 at Z axis Alignment K 01 Z | Degrees | 2 0E-5 -0 655 | U |
| 1552 | 16 | N/A | K band Alignment 48 at X axis Alignment K 48 X | Degrees | 20E-5 -0.655 | Ū |
| 1568 | 16 | N/A | K band Alignment 48 at Y axis Alignment K 48 Y | Degrees | 2.0E-50.655 | U |
| 1584 | 16 | N/A | K band Alignment 48 at Z axis Alignment K 48 Z | Degrees | 20E-5 -0.655 | Ū |
| 1600 | 16 | N/A | K band Alignment 96 at X axis Alignment K 96 X | Degrees | 2.0E-50.655 | U |
| 1616 | 16 | N/A | K band Alignment 96 at Y axis Alignment K 96 Y | Degrees | 2.0E-50.655 | U |
| 1632 | 16 | N/A | K band Alignment 96 at Z axis Alignment K 96 Z | Degrees | 2.0E-50.655 | U |
| 1648 | 16 | N/A | Ka band alignment 01 at X axis Alignment Ā 01 X | Degrees | 2.0E-50.655 | U |
| 1664 | 16 | N/A | Ka band Alignment 01 at Y axis Alignment A 01 Y | Degrees | 2.0E-50.655 | U |
| 1680 | 16 | N/A | Ka band Alignment 01 at Z axis Alignment A 01 Z | Degrees | 2.0E-50.655 | U |
| 1696 | 16 | N/A | Ka band Alignment 48 at X axis Alignment A 48 X | Degrees | 2.0E-50.655 | U |
| 1712 | 16 | N/A | Ka band Alignment 48 at Y axis Alignment_A_48_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1728 | 16 | N/A | Ka band Alignment 48 at Z axis Alignment A 48 Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1744 | 16 | N/A | Ka band Alignment 96 at X axis Alignment_A_96_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1760 | 16 | N/A | Ka band Alignment 96 at Y axis Alignment A 96 Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1776 | 16 | N/A | Ka band Alignment 96 at Z axis Alignment_A_96_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1792 | 16 | N/A | V band alignment 01 at X axis Alignment_V_01_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1808 | 16 | N/A | V band Alignment 01 at Y axis Alignment_V_01_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1824 | 16 | N/A | V band Alignment 01 at Z axis Alignment_V_01_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1840 | 16 | N/A | V band Alignment 48 at X axis Alignment_V_48_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1856 | 16 | N/A | V band Alignment 48 at Y axis Alignment_V_48_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1872 | 16 | N/A | V band Alignment 48 at Z axis Alignment_V_48_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1888 | 16 | N/A | V band Alignment 96 at X axis Alignment_V_96_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1904 | 16 | N/A | V band Alignment 96 at Y axis Alignment_V_96_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1920 | 16 | N/A | V band Alignment 96 at Z axis Alignment_V_96_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1936 | 16 | N/A | W band alignment 01 at X axis - Alignment_W_01_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1952 | 16 | N/A | W band Alignment 01 at Y axis Alignment_W_01_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1968 | 16 | N/A | W band Alignment 01 at Z axis Alignment_W_01_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 1984 | 16 | N/A | W band Alignment 48 at X axis Alignment_W_48_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2000 | 16 | N/A | W band Alignment 48 at Y axis Alignment_W_48_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2016 | 16 | N/A | W band Alignment 48 at Z axis Alignment_W_48_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2032 | 16 | N/A | W band Alignment 96 at X axis Alignment_W_96_X | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2048 | 16 | N/A | W band Alignment 96 at Y axis Alignment_W_96_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2064 | 16 | N/A | W band Alignment 96 at Z axis Alignment_W_96_Z | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2080 | 16 | N/A | G band alignment 01 at X axis Alignment_G_01_X | Degrees | -, -, -, 2.0E-5, -0.655 | U |
| 2096 | 16 | N/A | G band Alignment 01 at Y axis Alignment_G_01_Y | Degrees | -, -, -, 2.0E-5, -0.655 | U |

Table 4.1.6 ATMS Calibration Packet User Data Fields (cont)

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

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| Table 4.1.6 | ATMS Calibration | n Packet User | [·] Data Fields | (cont) |
|-------------|------------------|---------------|--------------------------|--------|
|-------------|------------------|---------------|--------------------------|--------|

| Start Bit | Bit Size | Memonic Name | Description | Units OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) OR | Data Type |
|-----------|-------------|--------------|---|--------------------|--|-----------|
| | 0120 | | | State Value | State Name | |
| 2112 | 16 | N/A | G band Alignment 01 at Z axis Alignment_G_01_Z | Degrees | , -, -, 2.0E-5, -0.655 | U |
| 2128 | 16 | N/A | G band Alignment 48 at X axis Alignment_G_48_X | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2144 | 16 | N/A | G band Alignment 48 at Y axis Alignment_G_48_Y | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2160 | 16 | N/A | G band Alignment 48 at Z axis Alignment_G_48_Z | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2176 | 16 | N/A | G band Alignment 96 at X axis Alignment_G_96_X | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2192 | 16 | N/A | G band Alignment 96 at Y axis Alignment G 96 Y | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2208 | 16 | N/A | G band Alignment 96 at 2 axis Alignment G 96_2 | Degrees | -, -, -, -, 2.0E-5, -0.655 | U |
| 2224 | 16 | N/A | K band shelt temperature, R0 parameter K_SHELF_PR1_R0 | Ohms | -, -, -, -, 0.003, 1900 | U |
| 2240 | 16 | N/A | K band shelf temperature, alpha parameter K_SHELF_PRT_alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | U |
| 2256 | 16 | N/A | K band shelf temperature, delta parameter K_SHELF_PK1_delta | Celsius | -, -, -, -, 5.0E-5, 0.0 | U |
| 22/2 | 16 | N/A | K band sheri temperature, KC parameter K_SHELF_PK1_KC | Ohms | -, -, -, -, 0.0003, 0.0 | 0 |
| 2288 | 16 | N/A | V band shelt temperature, RU parameter V SHELF_PRT_RU | Onms | -, -, -, 0.003, 1900 | 0 |
| 2304 | 10 | N/A | V band sheri temperature, alpha parameter V_SHELF_PK1_ alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | 0 |
| 2320 | 16 | N/A | V band shelf temperature, delta parameter V_SHELF_PK1_delta | Ceisius | -, -, -, 5.0E-5, 0.0 | 0 |
| 2336 | 16 | N/A | V band shelf temperature, RC parameter V_SHELF_PRI_RC | Onms | -, -, -, -, 0.0003, 0.0 | 0 |
| 2352 | 16 | N/A | W band sher temperature, RU parameter W SHELF PRI RU | Onms | -, -, -, 0.003, 1900 | 0 |
| 2368 | 10 | N/A | W band sheri temperature, alpha parameter W_SHELF_PRI_alpha | Celsius | -, -, -, 5.0E-8, 0.0020 | 0 |
| 2384 | 10 | N/A | W band shelf themperature, delta parameter W_SHELF_PK I_delta | Celsius | -, -, -, 5.0E-5, 0.0 | 0 |
| 2400 | 10 | N/A | Chand shell temperature, RC parameter W_SHELF_PK1_RC | Ohms | -, -, -, -, 0.0003, 0.0 | 0 |
| 2410 | 10 | N/A | | Onins Celeiue'' | -, -, -, -, 0.003, 1900 | 0 |
| 2432 | 10 | N/A | G bard shell temperature, alpha parameter - G SHELF PRT alpha | Celsius | -, -, -, -, 5.0E-8, 0.0020 | 0 |
| 2440 | 10 | N/A | | Ohma | -, -, -, -, 5.UE-5, U.U | 0 |
| 2404 | 10 | N/A | Chand BEE temperature, RC parameter - C_SALLRC | Ohma | -, -, -, -, 0.0003, 0.0 | 0 |
| 2480 | 10 | N/A N/A | | Coloius/Ohm | -, -, -, -, 0.003, 1900 | 0 |
| 2490 | 10 | N/A | KA band REE temperature, Al parameter - KA REE PRI A | Ohme | -, -, -, -, 3.0E-6, 0.0 | |
| 2012 | 16 | N/A | KA band PEE temperature, A1 parameter - KA PEE PPT A1 | Colcius/Ohm | -, -, -, -, 0.003, 1900 | |
| 2520 | 10 | N/A | V baild RFE temperature, R0 parameter V, PFE PRI R0 | Ohme | -, -, -, -, 3.0E-6, 0.0 | 0 |
| 2544 | 10 | N/A | V band REE temperature, AL parameter V_REE_PRI_AU | Celsius/Ohm | -, -, -, -, 0.003, 1900 | |
| 2500 | 10 | N/A | V band Kret temperature, AT parameter V_RETKI_AT | Ohmo | -, -, -, -, 3.0E-6, 0.0 | |
| 2570 | 10 | N/A | V band primary FL oscillator temperature, At parameter – V_FKI_FLO_FKI_KO | Coloius/Ohm | -, -, -, -, 0.003, 1900 | |
| 2092 | 10 | N/A | V band primary PL oscillator temperature, R0 parameter = V_FK_PL0_FKT_A1 | Ohme | -, -, -, -, 3.0E-0, 0.0 | - ŭ |
| 2008 | 16 | N/A | V band reduntancy PL oscillator temperature, A1 parameter V RED_PLO_FT(_K) | Celsius/Ohm | -, -, -, -, 0.003, 1900 | - ŭ |
| 2640 | 16 | Ν/Α | V band Feddinarby Te Oscillator temperature R0 narameter - V_TEB_TEO_TRT_AT | Ohms | -, -, -, -, 5.02-0, 0.0 | Ŭ Ŭ |
| 2656 | 16 | N/A | V band IF temperature A1 parameter V IF PRT A1 | Celsius/Ohm | -, -, -, -, 0.003, 1900 | Ŭ |
| 2672 | 16 | N/A | W band REE temperature R0 narameter - W REE PRT R0 | Ohms | -, -, -, -, 0.02-0, 0.0 | Ŭ |
| 2688 | 16 | N/A | W band REF temperature, A1 parameter W_REF_PRT_A1 | Celsius/Ohm | <u>-, -, -, 0.003, 1900</u> | Ŭ |
| 2000 | 16 | N/A | SAW filter temperature R0 parameter SAW FILT PRT R0 | Ohme | -, -, -, -, -, 0.0 | Ŭ, |
| 2704 | 16 | Ν/Α | SAW filter temperature A1 parameter SAW_ELT_PRT_A1 | Celsius/Ohm | -, -, -, -, 0.003, 1900 | Ŭ Ŭ |
| 2736 | 16 | N/A | W had IE temperature R0 narameter - W IE PRT R0 | Ohms | -, -, -, -, -, 0.02 | Ŭ |
| 2752 | 16 | N/A | W band IF temperature, A1 parameter W IF PRT A1 | Celsius/Ohm | -, -, -, -, 0.000, 1900 | Ŭ |
| 2768 | 16 | N/A | W band primary GD oscillator temperature, R0 parameter W PRI GD0 PRT R0 | Ohms | -, -, -, -, 0.003 1900 | ŭ |
| 2784 | 16 | N/A | W band primary GD oscillator temperature. At parameter W PRI GDO PRT A1 | Celsius/Ohm | -, -, -, 0.000, 1800 | ŭ |
| 2800 | 16 | N/A | W band reduntancy GD oscillator temperature R0 parameter W RED GDO PRT R0 | Ohms | 0.003 1900 | Ŭ |
| | | | RATION CHOILE | | | |

| | Bit | | | Units | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | |
|-----------|------|--------------|--|-------------|--|-----------|
| Start Bit | Size | Memonic Name | Description | OR | OR | Data Type |
| | 0120 | | | State Value | State Name | |
| 2816 | 16 | N/A | W band reduntancy GD oscillator temperature, A1 parameter W_RED_GDO_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 2832 | 16 | N/A | G band primary CS oscillator temperature, R0 parameter G_PRI_CSO_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 2848 | 16 | N/A | G band primary CS oscillator temperature, A1 parameter G_PRI_CSO_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 2864 | 16 | N/A | G band primary GD oscillator temperature, R0 parameter G_RED_CSO_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 2880 | 16 | N/A | G band primary GD oscillator temperature, A1 parameter G_RED_CSO_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 2896 | 16 | N/A | G band Path 1 IF temperature, R0 parameter G1_IF_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 2912 | 16 | N/A | G band Path 1 IF temperature, A1 parameter G1_IF_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 2928 | 16 | N/A | G band Path 2 IF temperature, R0 parameter G2_IF_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 2944 | 16 | N/A | G band Path 2 IF temperature, A1 parameter G2_IF_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 2960 | 16 | N/A | Receiver power supply path A temperature, R0 parameter RCVPS_A_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 2976 | 16 | N/A | Receiver power supply path A temperature, A1 parameter RCVPS_A_PRT_A1 | Celsius/Ohm | -, -, -, 3.0E-6, 0.0 | U |
| 2992 | 16 | N/A | Receiver power supply path B temperature, R0 parameter RCVPS_B_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 3008 | 16 | N/A | Receiver power supply path B temperature, A1 parameter RCVPS_B_PRT_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 3024 | 16 | N/A | Oscillator primary temperature, R0 parameter OCXO_PRI_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 3040 | 16 | N/A | Oscillator primary temperature, A1 parameter OCXO_PRI_PRT_A1 | Celsius/Ohm | -, -, -, 3.0E-6, 0.0 | U |
| 3056 | 16 | N/A | Oscillator reduntant temperature, R0 parameter OCXO_RED_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 3072 | 16 | N/A | Oscillator reduntant temperature, A1 parameter OCXO_RED_PRT_A1 | Celsius/Ohm | -, -, -, 3.0E-6, 0.0 | U |
| 3088 | 16 | N/A | 1553 Digital Signal Processor Side A, temperature reading, R0 parameter DSPA_1553_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 3104 | 16 | N/A | 1553 Digital Signal Processor Side A, temperature reading, A1 parameter DSPA_1553_PRT_A1 🤍 | Celsius/Ohm | -, -, -, 3.0E-6, 0.0 | U |
| 3120 | 16 | N/A | 1553 Digital Signal Processor Side B, temperature reading, R0 parameter DSPB_1553_PRT_R0 | Ohms | -, -, -, 0.003, 1900 | U |
| 3136 | 16 | N/A | 1553 Digital Signal Processor Side B, temperature reading, A1 parameter DSPB 1553 PRT A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3152 | 16 | N/A | Signal processing assembly power supply path A temperature, R0 parameter SPA_PS_A_PRT_R0 | Ohms | 0.003. 1900 | U |
| 3168 | 16 | N/A | Signal processing assembly power supply path A temperature, A1 parameter SPA PS A PRT A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3184 | 16 | N/A | Signal processing assembly power supply path B temperature. R0 parameter SPA_PS_B_PRT_R0 | Ohms | 0.003 1900 | U |
| 3200 | 16 | N/A | Signal processing assembly power supply path B temperature. A1 parameter SPA PS B PRT A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3216 | 16 | N/A | Digital Signal Processor, Side A temperature, R0 parameter DSPA, PROC PRT R0 | Ohms | 0.003, 1900 | U |
| 3232 | 16 | N/A | Digital Signal Processor, Side A temperature, A1 parameter DSPA PROC PRT A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3248 | 16 | N/A | Digital Signal Processor, Side B temperature, R0 parameter DSPB_PROC_PRT_R0 | Ohms | 0.003. 1900 | U |
| 3264 | 16 | N/A | Digital Signal Processor, Side B temperature, A1 parameter DSPB PROC PRT A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3280 | 16 | N/A | Scan drive mechanism temperature, R0 parameter - SD_MECH_TEMP_R0 | Ohms | -, -, -, 0,003, 1900 | U |
| 3296 | 16 | N/A | Scan drive mechanism temperature, A1 parameter SD_MECH_TEMP_A1 | Celsius/Ohm | -, -, -, -, 3.0E-6, 0.0 | U |
| 3312 | 16 | N/A | Scan drive mechanism power supply Side A temperature, R0 parameter SD_PS_PRTA_R0 | Ohms | -, -, -, 0,003, 1900 | U |
| 3328 | 16 | N/A | Scan drive mechanism power supply Side A temperature. A1 parameter SD PS PRTA A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3344 | 16 | N/A | Scan drive mechanism power supply Side B temperature. R0 parameter SD_PS_PRTB_R0 | Ohms | 0.003, 1900 | U |
| 3360 | 16 | N/A | Scan drive mechanism power supply Side B temperature, A1 parameter SD_PS_PRTB_A1 | Celsius/Ohm | 3.0E-6. 0.0 | U |
| 3376 | 16 | N/A | Housekeeping Reference Resistance #1, Side A MUXREST1 A | Ohms | 0.003. 1900 | Ū |
| 3392 | 16 | N/A | Housekeeping Reference Resistance #2, Side A MUXREST2 A | Ohms | 0.003 1900 | U |
| 3408 | 16 | N/A | Housekeeping Reference Resistance #1, Side B MUXREST1 B | Ohms | 0.003, 1900 | U |
| 3424 | 16 | N/A | Housekeeping Reference Resistance #2, Side B MUXREST2 B | Ohms | 0.003, 1900 | U |

The SD_MECH_TEMP, SD_PS_PRTA and SD_PS_PRTB (R0 and A1) parameters are not used for processing. Instead the ATSDMECHT and ATSDPST parameters in the Health and Status Engineering packet (Table 4.1.8) are used to derive the Scan Drive temperatures.

Engineering Data – Hot Cal Temperatures

The ATMS Hot Calibration Target Temperature Engineering Packet (APID 530) contains data used for SDR processing and is output every 8/3 seconds. It contains platinum resistance temperature (PRT) sensor data for the two hot calibration targets. The structure of APID 530 is illustrated in Figure 4.1-7 and the user data fields are listed in Table 4.1.7.



Figure 4.1-7 ATMS Engineering Hot Cal Temperature Packet Format



Table 4.1.7 ATMS Hot Cal Temperature Engineering Packet User Data Fields

| Start Bit | Bit Size | Memonic Name | Description | Units OR State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) OR State Name | Data Type |
|-----------|-------------|--------------|---|----------------------------|--|-----------|
| 0 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 1 reading KV_WL_4WPRT_1 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 16 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 2 reading KV_WL_4WPRT_2 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 32 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 3 reading KV_WL_4WPRT_3 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 48 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 4 reading KV_WL_4WPRT_4 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 64 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 5 reading KV_WL_4WPRT_5 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 80 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 6 reading KV_WL_4WPRT_6 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 96 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 7 reading KV_WL_4WPRT_7 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 112 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor 8 reading KV_WL_4WPRT_8 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 128 | 16 | N/A | K, Ka, V-band warm load 4 wire temp sensor reference resistance (gamma 1) KV_WL_4WRES | Counts | N/A | U |
| 144 | 16 | N/A | W, G-band warm load 4 wire temp sensor 1 reading WG_WL_4WPRT_1 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 160 | 16 | N/A | W, G-band warm load 4 wire temp sensor 2 reading WG_WL_4WPRT_2 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 176 | 16 | N/A | W, G-band warm load 4 wire temp sensor 3 reading WG_WL_4WPRT_3 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 192 | 16 | N/A | W, G-band warm load 4 wire temp sensor 4 reading WG_WL_4WPRT_4 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 208 | 16 | N/A | W, G-band warm load 4 wire temp sensor 5 reading WG_WL_4WPRT_5 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 224 | 16 | N/A | W, G-band warm load 4 wire temp sensor 6 reading WG_WL_4WPRT_6 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 240 | 16 | N/A | W, G-band warm load 4 wire temp sensor 7 reading WG_WL_4WPRT_7 🧥 📃 | Celsius | Eqn (1) and (2) of Section 4.1.4 | U |
| 256 | 16 | N/A | W, G-band warm load 4 wire temp sensor reference resistance (gamma 1) WG_WL_4WRES | Counts | N/A | U |

<text>

Engineering Data – Health and Status

The ATMS Health and Status Engineering Packet (APID 531) is output every 8 seconds, or every 3 scans. The contents are identical to the ATMS LEO&A and Housekeeping Packets: 2-wire temperature sensors, voltage monitors, scan drive telemetry and three status words -- SD MODE ERRORS, INSTRUMENT MODE, and ERROR STATUS (words 72, 73, and 74). Table 4.1.8 lists all the user data fields, each 16 bits (or 1 word) in length. The mnemonic column of Table 4.1.8 includes the Word Number associated with the telemetry item. The Word Number is used to identify the Safety-Critical-Limits-Telemetry item associated with Pow ure of APIL the ERROR_STATUS word and the Telemetry Item Word Number in the Dwell Packet (see Section 0). The UTC time in the secondary header represents the time the first sample is taken. The structure of APID 531 is illustrated in Figure 4.1-8.

| ATMS Engin | TMS Engineering Health and Status Packet | | | | | | | VERSION | с | | DATE : | 8/1/2004 | | | | | | | | | | | | | | | |
|------------|--|------------|------------|---------------|-------------|-------------------|------------|---------------------------------------|-------------------|-----------------------|--------------|-------------|------------|------------|------------|------------|----------------------|-------------|------------|------------|------------|-------------|-----------------------|-----------------------|-----------------------|-------------|-----|
| | | | | | | Fixed Pac | ket Length | 162 Octeta | | | | | | | | | | | | | | | | | | | |
| | <u> </u> | | | | | | | | | | | | | • | | | | | | | | | | | | | |
| | | | PACKE | ET PRIMARY H | HEADER | _ | | SECONDARY | | Us | ser Data Fie | eld | | | | | | | | | | | | | | | |
| | verson No. | Раске | t Identifi | cation | Contro | Sequence (PSC) | Length | NERDER | | ATMS En | gineering T | elemetry | | | | | | | | | | | | | | | |
| | | Type | Sec Hdr | APID | Sequence | Sequence | | Start of | | ATMS Healt | h and Statu | s Telemetr; | Y | | | | | | | | | | | | | | |
| | | Indicator | Flag | | Flags | Count | | Data | | | | | | | | | | | | | | J. | | | | | |
| | | | | | | | | | | | 1101 | | | TOTAL | | | | | | | | | | | | | |
| Bits | 3 | 1 | 2 | 11 | 2 | 2 14 | 2 | 64 | | | 1164 | | | 1296 | | | | | | - A N | | | | | | | |
| Value | 000 | 0 | , 1 | 21316 | 11 | 00016 | 09B16 | varies | | | varies | <u> </u> | | 102 | | | | | | | | | | | | | |
| | | | 1 | | <u> </u> | | | · · · · · · · · · · · · · · · · · · · | , , | | | | | | | | | | | | · | | | | | | |
| | | | Second | lary Header | l Y | Standalone P | acket | | \ | CCSDS Da Segmented | iy i | | | | | | | | | | | | | | | | |
| | ATMS Engin | eering Tel | emetry H | Health and S | Status | | | | | | | | <u> </u> | | | | | | | | | | | | | | |
| | Software | SPA_P5V_? | SPA_P15V_3 | SPA_N15V_? | RCV_P6V_RE | FRCV_P12V_F | RCV_P15V_ | RCV_N15V_R | RCV_P15V_A | RCV_N15V_7 | K_RFE_PRT | KA_RFE_PRT | V_RFE_PRT | V_PRI_PLO_ | V_RED_PLO_ | V_IF_PRT | W_RFE_PRT | SAW_FILT_ | W_IF_PRT | W_PRI_GDO_ | W_RED_GDO_ | G_PRI_CSO_ | G_RED_CSO_ | G1_IF_PRT | G2_IF_PRT | | |
| | Version/Se rial | VMON | -VMON | -VMON | -VMON | F2_VMON | F_VMON | F_VMON | NA_VMON | NA_VMON | | | | PRT | PRT | | | RT | | PRT | PRT | PRT | PRT | | | | |
| | Number | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | see Note 1 | see Note 1 | 1 see Note 1 | | | | | | | | | | | | | | | 1 | | | | | | | | > |
| Word # | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | subtotal | _ \ |
| Bits | 16 | 16 | 16 | 2 | 16 | 2 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 2 | 16 | 16 | 16 | 16 | 16 | 16 | 2 | 2 | 2 | 2 | 2 | 400 |) |
| Value | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | 30 | / |
| | | | | | | | | | | | | | | | | | | | | | | | | | _ | \sim | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| / | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ATMS Engin | eering Tel | emetry H | Health and S | Status (Con | ntinued) | | | | | | | | | | | | | | | | | | | | | |
| 1 | W_SHELF_PR | KKA_SHELF_ | G_SHELF_PE | R V_SHELF_PR | RCVPS_A_PF | R RCVPS_B_PF | OCXO_PRI_I | POCXO_RED_P | DSPA_1553_ DRT | DSPB_1553_ PRT | SPA_PS_A_P | SPA_PS_B_F | DSPA_PROC_ | DSPB_PROC_ | SD_MECH_TE | SD_PS_PRT | V_PLO_A_L CK_VMON | OV_PLO_B_LO | HK_2WREST1 | HK_2WREST2 | 4W_GND_? | 2W_GND_? | VD_REF_?; Module_1 | VD_REF_?; Module 2 | VD_REF_?; Module_3 | | |
| | ſ | | <u>^</u> | 2 | <u>^</u> | | | | | | *** | *** | | | | | on_mon | on_mon | | | | | nounic 1 | noute L | - | | |
| | | | | | | | | | | | | | | | | - | | | see Note 1 | see Note 1 | see Note 1 | lsee Note 1 | see Note 1 | see Note 1 | see Note 1 | | > |
| Word # | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | subtotal | |
| Bits | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 400 |) |
| Value | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies . | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | | / |
| | | | | | | | | | | | | | | | · | | | | | | | | | | ~ | | |
| | | | | | | | | | | | | | _ | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | amire Danie | and an Mal | | Unality and d | 0 | a de al second d | | | | | | | | 2 | | | | | | | | | | | | | |
| | VD REF ?; | VD GND ?; | VD GND ?; | VD GND ?; | VD GND ?; | SD P5V VMC | SD P12V VM | SD N12V VM | MAIN MOTOR | COMP MOTOR | RESOLVER V | SD MAIN MC | SD COMP MC | SD MAIN LO | SD MAIN LO | SD MAIN LC | SD COMP L | OSD MAIN MO | SD COMP MO | SD FEED FO | COMP MOTOR | SD MODE EF | INSTRUMENT | ERROR STAT | | | |
| \sim | Module 4 | Module 1 | Module 2 | Module 3 | Module 4 | N | ON | ON | CUR | CUR | MON | TOR_VEL | TOR_VEL | OP_ERROR | OP_INT_ERR | OP_VEL_ERR | OP_ERROR | TOR_REQ_VO | TOR_REQ_VO | RWARD_VOLT | POS | RORS | _MODE | us – | | | |
| | | | | | | | | | | | | | | | UR | UK | | LTAGE | LTAGE | AGE | | | | | | | |
| | see Note 1 | see Note 1 | see Note | see Note 1 | see Note 1 | 1 | | | | | | | | | | | | | | | | see Note 2 | see Note 2 | see Note 2 | | user data | |
| Word # | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | subtotal | field total | |
| Bits | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 384 | 1184 | |
| Octets | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 48 | 148 | |
| Value | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | varies | | | |

Figure 4.1-8 ATMS Engineering Health and Status Packet Format

NOTES:

- "?" represents "A" or "B" depending on which side is active.
 See Table 4.1.8 for bit assignments of these fields.

| Memonic Name vell Item Number) ATSWVER2 ATSPAP5V ATSPAP15V ATSPAM15V ITRCVP6RF1V TRCVP15RF1V TRCVP15RF1V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV TRCVM15ANAV | Description Software Version/Serial Number (1) Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_P15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_AA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_AA_VMON (9) | Units OR State Value N/A Volts Volts Volts Volts Volts Volts Volts Volts Volts Volts | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) OR State Name N/A 8.5832E-05, 0.00 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5528E-04, 0.70 | Data Type U U U U U U U U |
|--|---|--|--|--|
| ATSWVER2 ATSPAP5V ATSPAP5V ATSPAP15V ATSPAM15V ATSPAM15V TRCVP12RF2V TRCVP12RF2V TRCVP15RF1V TRCVP15RF1V TRCVP15ANAV TRCVM15ANAV TRCVM15ANAV | Description Software Version/Serial Number (1) Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (3) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | OR State Value N/A Volts Volts Volts Volts Volts Volts Volts Volts Volts | OR State Name N/A 8.5832E-05, 0.00 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5525E-04, 0.70 | Data Type U U U U U U U U U U |
| ATSWVER2 ATSPAP5V ATSPAP5V ATSPAM15V TRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV TRCVM15ANAV ATKRFET | Software Version/Serial Number (1) Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (3) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | State Value N/A Volts Vo | State Name N/A 8.5832E-05, 0.00 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5628E-04, 0.70 | |
| ATSWVER2 ATSPAP5V ATSPAP15V ATSPAM15V ITRCVP6RF1V TRCVP15RF2V TRCVP15RF1V TRCVM15RF1V TRCVM15RAV TRCVM15ANAV ATKRFET | Software Version/Serial Number (1) Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | N/A Volts Volts Volts Volts Volts Volts Volts | N/A 8.5832E-05, 0.00 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5528E-04, 0.70 | |
| ATSPAP5V ATSPAP15V ATSPAM15V TRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV TRCVM15ANAV ATKRFET | Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) | Volts Volts Volts Volts Volts Volts Volts | 8.5832E-05, 0.00 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5528E-04, 0.70 | U U U U U U U |
| ATSPAP5V ATSPAP15V ATSPAM15V TRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV ATKRFET | Signal Processing Assembly Secondary Voltage Monitor SPA_P5V_A_VMON or SPA_P5V_B_VMON (2) Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (3) Receiver Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P12V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | Volts Volts Volts Volts Volts Volts Volts Volts | 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5628E-04, 0.70 | |
| ATSPAP15V ATSPAM15V TRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV TRCVM15ANAV ATKRFET | Signal Processing Assembly Secondary Voltage Monitor – SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor – SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor – RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor – RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor – RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor – RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor – RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor – RCV_P15V_ANA_VMON (10) | Volts Volts Volts Volts Volts Volts | 2.7466E-04, 0.00 -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5628E-04, 0.70 | U U U U |
| ATSPAM15V ATSPAM15V ITRCVP6RF1V TRCVP15RF1V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV ATKRFET ATKRFET | Signal Processing Assembly Secondary Voltage Monitor SPA_P15V_A_VMON or SPA_P15V_B_VMON (3) Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_N15V_ANA_VMON (10) | Volts Volts Volts Volts Volts Volts | -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5528E-04, 0.70 | |
| ATSPAM15V ITRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVM15RF1V TRCVM15ANAV ATKRFET ATKRFET | Signal Processing Assembly Secondary Voltage Monitor SPA_N15V_A_VMON or SPA_N15V_B_VMON (4) Receiver Secondary Voltage Monitor RCV_P6V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | Volts Volts Volts Volts Volts | -2.7466E-04, 0.00 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5528E-04, 0.70 | U U U |
| ITRCVP6RF1V TRCVP12RF2V TRCVP15RF1V TRCVP15RF1V TRCVP15ANAV TRCVP15ANAV TRCVM15ANAV ATKRFET | Receiver Secondary Voltage Monitor RCV_P12V_RF_VMON (5) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (6) Receiver Secondary Voltage Monitor RCV_P12V_RF2_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | Volts Volts Volts Volts Volts | 1.0717E-04, 0.00 2.12505E-04, 0.00 2.5628E-04, 0.70 | U U U |
| TRCVP15RF1V TRCVP15RF1V TRCVP15RF1V TRCVP15RF1V TRCVP15ANAV TRCVM15ANAV ATKRFET | Receiver Secondary Voltage Monitor – RCV_P12V_RF_VMON (6) Receiver Secondary Voltage Monitor – RCV_P12V_RF_VMON (7) Receiver Secondary Voltage Monitor – RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor – RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor – RCV_P15V_ANA_VMON (10) | Volts Volts Volts Volts | 2.12505E-04, 0.00 2.5628E-04, 0.70 | U |
| TRCVP15RF1V TRCVP15RF1V TRCVP15ANAV TRCVP15ANAV TRCVP15ANAV ATKRFET | Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (7) Receiver Secondary Voltage Monitor RCV_P15V_RF_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON (10) | Volts Volts Volts | 2.5628E-04, 0.70 | 0 |
| TRCVP15RF1V TRCVM15RF1V TRCVP15ANAV TRCVM15ANAV ATKRFET | Receiver Secondary Voltage Monitor RCVISV_RT_VMON (8) Receiver Secondary Voltage Monitor RCV_P15V_RA_VMON (9) Receiver Secondary Voltage Monitor RCV_N15V_ANA_VMON (10) | Volts | 2.3028E-04, 0.70 | 11 |
| TRCVP15ANAV TRCVP15ANAV TRCVM15ANAV ATKRFET | Receiver Secondary Voltage Monitor RCV_P15V_AA_VMON (9) Receiver Secondary Voltage Monitor RCV_P15V_AAA_VMON (10) | Volts | 2 56285 04 0 70 | 0 |
| IRCVP15ANAV IRCVM15ANAV ATKRFET | Receiver Secondary Voltage Monitor RCV_P15V_ANA_VMON(9) Receiver Secondary Voltage Monitor RCV_N15V_ANA_VMON (10) | | -2.5626E-04, -0.70 | 0 |
| ATKREET | Receiver Secondary Voltage Monitor RCV_NTSV_ANA_VMON (TU) | Volta | 2.6560E-04, 0.00 | 0 |
| ATKAPET | K hand Baseline Fred Fred Terroretory and the (Online DBT) K DEF DDT (44) | Voits | -2.6560E-04, 0.00 | 0 |
| | K-band Receiver Front End Temperature monitor (2-wire PKT) K_KFE_PKT (11) | Ceisius | Eqn (3) of Section 4.1.4 | 0 |
| ATKARFET | Ka-Band Receiver Front End Temperature monitor (2-wire PRT) KA_RFE_PRT (12) | Celsius | Eqn (3) of Section 4.1.4 | 0 |
| ATVRFET | V-Band Receiver Front End Temperature monitor (2-wire PRT) V_RFE_PRT (13) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATVPLO1T | V-Band Primary PLL Oscillator Temperature monitor (2-wire PRT) V_PRI_PLO_PRT (14) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATVPLO2T | V Rend Redundent RLL Oscillator Temperature menitor (2 wire RRT) V RED RLO RRT (15) | Coloiuo | Eqn (2) of Section 4.1.4 | |
| | V-band Reduridant PEL Oscillator Temperature monitor (2 wire PRT) - V_PDT (40) | Celsius | Eqn (3) of Section 4.1.4 | 0 |
| ATVIET | V-band in Module Temperature monitor (2-wile PRT) V_IF_PRT (16) | Celsius | Eqn (3) of Section 4.1.4 | 0 |
| ATOMAT | W-band Receiver Front End Temperature monitor (2-wire PRT) W_RFE_PRT (1/) | Celsius | Eqn (3) of Section 4.1.4 | 0 |
| ATSAWI | SAW miter Temperature monitor (2-wire PRT) - SAW_FILT_PRT (18) | Ceisius | Eqn (3) of Section 4.1.4 | 0 |
| ATWIFT | W-band IF Module Temperature monitor (2-wire PRT) W_F_PRT (19) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATWGDO1T | W-band Primary Gunn Diode Oscillator Temperature monitor (2-wire PRT) W, PRL GDO, PRT (20) | Celsius | Eqn (3) of Section 4.1.4 | - U |
| ATWGDO2T | Temperature monitor (2-wire PRT) W RED GDO PRT (21) | Celsius | Eqn (3) of Section 4.1.4 | Ŭ |
| | | | | - |
| AIGCS011 | G-band Primary Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) G_PRI_CSO_PRT (22) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATGCS02T | | | | |
| ///000021 | G-band Redundant Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) G_RED_CSO_PRT (23) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATG1IFT | G-band IF Module #1 Temperature monitor (2-wire PRT) G1_IF_PRT (24) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATG2IFT | G-band IF Module #2 Temperature monitor (2-wire PRT) G2_IF_PRT (25) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATWSHELFT | W-band Shelf Temperature monitor (2-wire PRT) W_SHELF_PRT (26) | Celsius | Eqn (1) of Section 4.1.4 | U |
| ATKSHELFT | K, Ka-band Shelf Temperature monitor (2-wire PRT) KKA_SHELF_PRT (27) | Celsius | Eqn (1) of Section 4.1.4 | U |
| ATGSHELFT | G-band Shelf Temperature monitor (2-wire PRT) G_SHELF_PRT (28) | Celsius | Eqn (1) of Section 4.1.4 | U |
| ATVSHELFT | V-band Shelf Temperature monitor (2-wire PRT) V_SHELF_PRT (29) | Celsius | Eqn (1) of Section 4.1.4 | U |
| ATRCVAT | Receiver Power Supply, Side A Temperature monitor (2-wire PRT) RCVPS_A_PRT (30) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATRCVBT | Receiver Power Supply, Side B Temperature monitor (2-wire PRT) RCVPS_B_PRT (31) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATOCXO1T | Primary Oven-controlled Crystal Oscillator Temperature monitor (2-wire PRT) OCXO_PRI_PRT (32) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATOCXO2T | Redundant Oven-controlled Crystal Oscillator Temperature monitor (2-wire PRT) OCXO_RED_PRT (33) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATDSPAT | 1553 Digital Signal Processor, Side A Temperature monitor (2-wire PRT) DSPA_1553_PRT (34) | Celsius | Eqn (3) of Section 4.1.4 | U |
| ATDSPBT | 1553 Digital Signal Processor, Side A Temperature monitor (2-wire PRT) DSPB_1553_PRT (35) | Celsius | Eqn (3) of Section 4.1.4 | U |
| | ATVPLO2T ATVIFT ATVIRFPT ATSAWT ATWRFPT ATSAWT ATWIFT TWGD01T TWGD02T TGCS01T TGCS01T TGCS02T ATG2IFT TVSHELFT TVSHELFT TVSHELFT TVSHELFT TVSHELFT TVSHELFT TVSHELFT TOSHELFT TVSHELFT TOSHELFT TOSHELFT TOSHELFT TOSHELFT TOSHELFT ATRCVBT TOCX01T ATDSPAT ATDSPAT | Website Vebsite Vestigation V | Website Veband Primary PLL Oscillator Temperature monitor (2-wire PR1) – V_PRE_D_PLO_PRT (14) Celsius ATVPEL02T Veband Redundant PLL Oscillator Temperature monitor (2-wire PRT) – V_RED_PLO_PRT (15) Celsius ATVIET Veband R Module Temperature monitor (2-wire PRT) – V_RED_PLO_PRT (15) Celsius ATVMETPT Weband Receiver Front End Temperature monitor (2-wire PRT) – W_REE_PRT (17) Celsius ATVMET SAW filter Temperature monitor (2-wire PRT) – W_REE_PRT (18) Celsius ATVMET Weband Receiver Front End Temperature monitor (2-wire PRT) – W_REE_OD_PRT (20) Celsius ATVIET Weband Primary Gunn Diode Oscillator Temperature monitor (2-wire PRT) – W_RED_GD_PRT (20) Celsius TWGD01T Weband Primary Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G_RED_CSO_PRT (22) Celsius TGCSO2T G-band Redundant Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G_RED_CSO_PRT (23) Celsius TG2SO2T G-band Redundant Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G_RED_CSO_PRT (23) Celsius TG2SO2T G-band Redundant Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G_RED_CSO_PRT (23) Celsius TG2SO2T G-band Redundant Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G_RED_CSO_PRT (23) | Oversity Use and Primary PLL Oscillator Temperature monitor (2-wire PRT) – V, PRC (PLQ PRT (16) Calsus Eqn (3) of Section 4.1.4 ATVIFIT V-Band Redundant PLL Oscillator Temperature monitor (2-wire PRT) – V, PE PPT (16) Calsus Eqn (3) of Section 4.1.4 ATVIFIT W-Band Redundant PLL Oscillator Temperature monitor (2-wire PRT) – V, PE PPT (16) Calsus Eqn (3) of Section 4.1.4 ATVIFIT W-Band Receiver Front End Temperature monitor (2-wire PRT) – W, REE PRT (17) Calsus Eqn (3) of Section 4.1.4 ATVIFIT W-band Receiver Front End Temperature monitor (2-wire PRT) – W, REE PRT (18) Calsus Eqn (3) of Section 4.1.4 ATWIFIT W-band Primary Gunn Diode Oscillator Temperature monitor (2-wire PRT) – W, PRI (50) Calsus Eqn (3) of Section 4.1.4 TMGGDQT Temperature monitor (2-wire PRT) – W, PRI (50) Calsus Eqn (3) of Section 4.1.4 TMGGDQT Temperature monitor (2-wire PRT) – G, PRI (20) Calsus Eqn (3) of Section 4.1.4 TGGS01T G-band Primary Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G, PRI (20) Calsus Eqn (3) of Section 4.1.4 TGGS01T G-band Primary Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G, PRT (20) Calsus Eqn (3) of Section 4.1.4 TGSS01T G-band Primary Cavity-Stabilized Oscillator Temperature monitor (2-wire PRT) – G, PRT (21) Calsus Eqn (3) of Section 4.1.4 |

Table 4.1.8 ATMS Health and Status Engineering Packet User Data Fields

| 560 16 576 16 592 16 608 16 624 16 640 16 | ATSPAAT ATSPABT ATSPABT ATDSPAPT ATDSPBPT | Signal Processing Assembly Power Supply, Side A Temperature monitor (2-wire PRT) SPA_PS_A_PRT (36) Signal Processing Assembly Power Supply, Side A Temperature monitor (2-wire PRT) SPA_PS_B_PRT (37) Digital Signal Processor, Side A Processor Temperature monitor (2-wire PRT) DSPA_PROC_PRT (38) | Celsius Celsius | Eqn (3) of Section 4.1.4 Eqn (3) of Section 4.1.4 | U |
|---|---|--|--------------------|--|---|
| 576 16 592 16 608 16 624 16 640 16 | ATSPABT ATDSPAPT ATDSPBPT | Signal Processing Assembly Power Supply, Side A Temperature monitor (2-wire PRT) SPA_PS_B_PRT (37) Digital Signal Processor, Side A Processor Temperature monitor (2-wire PRT) DSPA_PROC_PRT (38) | Celsius | Eqn (3) of Section 4.1.4 | U |
| 592 16 608 16 624 16 640 16 | ATDSPAPT ATDSPBPT | Digital Signal Processor, Side A Processor Temperature monitor (2-wire PRT) DSPA_PROC_PRT (38) | Coloiua | | |
| 608 16 624 16 640 16 | ATDSPBPT | | Celsius | Eqn (3) of Section 4.1.4 | U |
| 624 16 640 16 | | Digital Signal Processor, Side A Processor Temperature monitor (2-wire PRT) DSPB_PROC_PRT (39) | Celsius | Eqn (3) of Section 4.1.4 | U |
| 040 10 | | Scan Drive Mechanism Temperature monitor (2-wire PRT) SD_MECH_TEMP (40) | Celsius | [1000,000x(Count-399.3371))/[8905947-(1907.3xCount)] | 0 |
| | AISDEST | | Celsius | 2 0399E-04 0 00 | 0 |
| 656 16 | 5 ATVPLOAV | V-band Phase-Lock Loop Oscillator Voltage Monitor, Side A V_PLO_A_LOCK_VMON (42) | Volts | | U |
| 672 16 | 3 ATVPLOBV | V-band Phase-Lock Loop Oscillator Voltage Monitor, Side B V_PLO_B_LOCK_VMON (43) | Volts | 2.0399E-04, 0.00 | U |
| 688 16 | 3 ATHK2WREF1 | 2-wire PRT Housekeeping 1 Resistance (gamma 1) HK_2WREST1_A or HK_2WREST1_B (44) | Counts | Eqn (1) of Section 4.1.4 | U |
| 704 16 | ATHK2WREF2 | 2-wire PRT Housekeeping 2 Resistance (gamma 1) HK_2WREST2_A or HK_2WREST2_B (45) | Counts | Eqn (1) of Section 4.1.4 | U |
| 720 16 | 6 AT4WGNDT | 4-Wire PRT Ground Resistance (gamma 0) 4W_GND_A or 4W_GND_B (46) | Counts | Eqn (1) of Section 4.1.4 | U |
| 736 16 | 6 AT2WGNDT | 2-Wire PRT Ground Resistance (gamma 0) 2W_GND_A or 2W_GND_B (47) | Counts | Eqn (1) of Section 4.1.4 | U |
| 752 16 | 6 ATVDREF1 | Video Digitizer, Module 1, Reference Voltage VD_REF_A or VD_REF_B; Module 1 (48) | Volts | 6.8666E-05, 0.00 | U |
| 768 16 | 6 ATVDREF2 | Video Digitizer, Module 1, Reference Voltage VD_REF_A or VD_REF_B; Module 2 (49) | Volts | 6.8666E-05, 0.00 | U |
| 784 16 | 6 ATVDREF3 | Video Digitizer, Module 1, Reference Voltage VD_REF_A or VD_REF_B; Module 3 (50) | Volts | 6.8666E-05, 0.00 | U |
| 800 16 | 6 ATVDREF4 | Video Digitizer, Module 1, Reference Voltage VD_REF_A or VD_REF_B; Module 4 (51) | Volts | 6.8666E-05, 0.00 | U |
| 816 16 | 6 ATVDGND1 | Video Digitizer, Module 1, Ground Voltage VD_GND_A or VD_GND_B; Module 1 (52) | Volts | 6.8666E-05, 0.00 | U |
| 832 16 | 6 ATVDGND2 | Video Digitizer, Module 1, Ground Voltage VD_GND_A or VD_GND_B; Module 2 (53) | Volts | 6.8666E-05, 0.00 | U |
| 848 16 | 6 ATVDGND3 | Video Digitizer, Module 1, Ground Voltage VD_GND_A or VD_GND_B; Module 3 (54) | Volts | 6.8666E-05, 0.00 | U |
| 864 16 | 6 ATVDGND4 | Video Digitizer, Module 1, Ground Voltage VD_GND_A or VD_GND_B; Module 4 (55) | Volts | 6.8666E-05, 0.00 | U |
| 880 16 | 6 ATSDP5V | Scan Drive, +5 V Power Supply Monitor SD_P5V_VMON, Count1 (56) | Volts | 5008/Count1 | U |
| 896 16 | 6 ATSDP12V | Scan Drive, +12 V Power Supply Monitor SD_P12V_VMON, Count3 (57) | Volts | [(4.284xCount3)-(45.08657*Count2)/Count1]+43.30089 | U |
| 912 16 | 6 ATSDM12V | Scan Drive, -12 V Power Supply Monitor SD_N12V_VMON, Count2 (58) | Volts | [63.096xCount2/Count1]-60.6212 | U |
| 928 16 | 6 ATSDMMI | Scan Drive Main Motor Current MAIN_MOTOR_CUR (59) | Amps | -, -, -, 0.021777, -0.3888 | S |
| 944 16 | 6 ATSDCMI | Scan Drive Compensation Motor Current COMP_MOTOR_CUR (60) | Amps | -, -, -, 0.021777, -0.3888 | S |
| 960 16 | 6 ATRESV | Scan Drive Resolver Voltage RESOLVER VMON (61) | Volts | -, -, -, 0.008817, 0.0 | S |
| 976 16 | 6 ATSDMMVEL | Scan Drive Main Motor Velocity SD_MAIN_MOTOR_VEL (62) | Deg/sec | -, -, -, 0.0625, 0.0 | S |
| 992 16 | 3 ATSDCMVEL | Scan Drive Compensation Motor Velocity SD_COMP_MOTOR_VEL (63) | Deg/sec | -, -, -, 0.0625, 0.0 | S |
| 1008 16 | 6 ATSDMLPERR | Scan Drive Main Motor Loop Error SD MAIN LOOP ERROR (64) | Dea | 0.005493. 0.0 | S |
| 1024 16 | 3 ATSDMINTERR | Scan Drive Main Motor Loop Integral Error SD MAIN LOOP INT ERROR (65) | Dea | 0.005493. 0.0 | S |
| 1040 16 | 6 ATSDMVELERR | Scan Drive Main Motor Velocity Error SD MAIN LOOP VEL ERROR (66) | Dea/sec | 0.0625. 0.0 | S |
| 1056 16 | 3 ATSDCVELERR | Scan Drive Compensation Motor Loop Velocity Error SD COMP LOOP VEL ERROR (67) | Deg/sec | 0.0625 0.0 | ŝ |
| 1072 16 | 3 ATSDMMRV | Scan Drive, Main Motor Reg Voltage SD MAIN MOTOR REG VOLTAGE (68) | Volts | 0.0005493164 0.0 | ŝ |
| 1088 16 | | | Volte | 0.0005493164 0.0 | 9 |
| 1104 16 | | Scal Drive Some Sade Forward Voltage - SD_EED_FORWARD VOLTAGE (30) | Volte | -; -; -; -; 0:0003433104; 0:0 | 6 |
| 1104 10 | | Scali Dire Feed Polivaid Volage SD_FEED_FORWARD_VOLAGE (70) | Deg | 456752/C00IIt | 3 |
| 1120 10 | | Scall Drive dompensation motion resolution = Convir_motor(Convir_motor(Convir_motor(Convirt))) | N/A | -, -, -, -, 0.003433104, 0.0 | |
| 1130 10 | ATSDNODE | | 0 | "Reset" command received | 0 |
| 1136 1 | ATPWCYC | SDME Power Cycle Flag | 1 | "Power on Reset" occurred | в |
| 1127 1 | ATSTNDBY | SDME Standby Mode | 0 | Other Mode | в |

Table 4.1.8 ATMS Health and Status Engineering Packet User Data Fields (cont)

| Start Bit | Bit Size | Memonic Name | Description | Units OR State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) OR State Name | Data Type |
|-----------|-------------|--|---|----------------------------|--|-----------|
| 1138 | 1 | ATSCANP | SDME Scan from PROM | 0 1 | SDE Scan not from PROM SDE is using Scan from PROM | в |
| 1120 | 1 | ATSCANR | SDME Scon from BAM | 0 | SDE Scan not from RAM | в |
| 1140 | 1 | N/A | SDME Scanton Horw | 0 | N/A | 0 |
| 1140 | 1 | N/A | SDME == 0 | 0 | N/A N/A | 0 |
| | | 1071 | | 0 | Scan Drive not in Stare mode | |
| 1142 | 1 | ATSTATE | SDME Stare Mode | 1 1 | Scan Drive is in Stare mode | в |
| 1143 | 1 | N/A | SDME 0 | 0 | N/A | 0 |
| | | | | | | |
| | | 47010040 | | 0 | | |
| | | ATCMDPAR | | | Command Received with proper parity | |
| 1144 | 1 | | SDME Command Parity Error | 1 | Command Received with illegal parity | В |
| | | | | | | |
| | | | | 0 | | |
| | | ATCMIDLEN | | | Proper length command received | |
| 1145 | 1 | | SDME Command Length Error | 1 | Command received with illegal length | В |
| | | ATOMOUL | | 0 | SDE received valid command | |
| 1146 | 1 | ATCMDILL | SDME Illegal Command | 1 | SDE received illegal command | В |
| | | ATMANINUUR | | 0 | Power to Main Motor On | |
| 1147 | 1 | ATMIMINHIB | SDME Main Motor Inhibited | 1 | No Power to Main Motor | В |
| | | ATRIDE | | 0 | SDE Redundancy set to Side B | |
| 1148 | 1 | ATSIDE | SDME Side A Selected | 1 | SDE Redundancy set to Side A | В |
| | | ATCOMPMOTOR | | 0 | Compensatiion Motor On | |
| 1149 | 1 | ATCOMPMOTOR | SDME Compensation Motor Off | 1 | Compensation Motor Off | В |
| 1150 | 1 | N/A | SDME 0 | 0 | N/A | 0 |
| | | | | 0 | No SDE Error | |
| 1151 | 1 | AIGHNID | SDME 64X RTD Error Flag | 1 | SDE Error Present | В |
| 1152 | 16 | ATIMODE | Instrument Mode Word (IMW) INSTRUMENT_MODE (73) | N/A | N/A | N/A |
| 1152 | 1 | N/A | IMW Blank | 0 | N/A | 0 |
| | | ATSAFEHOLD | | 0 | Instrument not in Safe Hold | _ |
| 1153 | 1 | A REAL PROPERTY AND A REAL | IMW Safe Hold Mode | 1 | Instrument is in Safe Hold Mode | В |
| | | ATCSAMP | | 0 | Other mode selected | |
| 1154 | 1 | | INVV Continuous Sampling | 1 | Continuous Sampling Selected | В |
| 4455 | 4 | ATDEWLLEN | IMM/ Dural Data Eachlad | 1 | Dwell packets disabled | Б |
| 1155 | | | | | Diveri packets eriableu | В |
| 1156 | 1 | ATDIAGEN | IMW – Diagostic Data Enabled | 1 | Diagnostic Data Enabled | в |
| 1150 | | | INITY Diagnostic Data Enabled | 0 | Lising 8 second pulse | 5 |
| 1157 | 1 | ATSYNC | IMW - Synchronization Mode (8-sec pulse or 1-sec massage) | 1 | Using 0 second pulse | в |
| 1107 | | | | 000 | PROM Default Profile | |
| | | | | 001 | RAM Profile 1 | |
| | | | | 010 | RAM Profile 2 | |
| | | ATSCANID | | 011 | RAM Profile 3 | |
| | | 711007.010 | | 100 | RAM Profile 4 | |
| | | | | 101 | Stare | |
| 1158 | 3 | | IMW Scan Pattern ID | 111 | Off | в |
| 1100 | Ű | | | | | |
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| | | | V | | | |
| | | | 7 7 | | | |

Table 4.1.8 ATMS Health and Status Engineering Packet User Data Fields (cont)

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| Start Bit | Bit<br>Size | Memonic Name | Description                                 | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name            | Data Type |
|-----------|-------------|--------------|---------------------------------------------|----------------------------|---------------------------------------------------------------------------------------|-----------|
| 1161      | 1           | ATPLOLOCK    | IMW PLO Lock Indicator                      | 0                          | PLO not locked<br>PLO Lock signal detected                                            | в         |
| 1162      | 1           | ATRXST       | IMW Receiver Enable                         | 0                          | Receiver Subsystem Disabled<br>Receiver Subsystem Enabled                             | в         |
| 1163      | 1           | ATSDCEN      | IMW SD Compensator Enable                   | 0                          | SD Compensator Motor Disabled<br>SD Compensator Motor Enabled                         | в         |
| 1164      | 1           | ATSDST       |                                             | 0                          | SDE disabled                                                                          |           |
| 1104      | 4           | ATSPA        |                                             | 0                          | SPA A selected                                                                        | D         |
| 1100      |             | ATSAWF       |                                             | 0                          | SAM Filter A selected                                                                 | B         |
| 1100      | 1           | ATBLOCK      |                                             | 0                          | Redundancy A Block selected                                                           | В         |
| 1167      | 16          | ATERROR1     | Error Status Word (ESW) ERROR_STATUS (74)   | N/A                        | N/A                                                                                   | N/A       |
| 1168      | 1           | ATHADCLU     | ESW Housekeeping ADC Latch-up               | 0                          | No Housekeeping Latch-up<br>Latch-up condition on Housekeeping CCA                    | в         |
| 1169      | 1           | ATVADCLU     | ESW Video ADC Latch-up                      | 0                          | No Video Digitizer Latch-up<br>Latch-up condition on Video Digitizer CCA              | в         |
| 1170      | 2           | ATTIME       | ESW Time Error                              | 00<br>01<br>10<br>11       | No Error<br>TOD Pulse<br>TOD Message<br>Boundary Pulse                                | в         |
| 1172      | 1           | ATDPAR       | ESW SDE Data Parity Error                   | 0<br>1                     | No parity Error<br>17-bit telemetry has parity error                                  | в         |
| 1173      | 1           | ATSDETHPAR   | ESW SDE Telemetry Header Parity Error       | 0                          | No parity Error<br>9-bit header has parity error                                      | в         |
| 1174      | 1           | ATSDEDNA     | ESW SDE Position Data not Available         | 0                          | Position Data Available<br>SDE Position Data not Available                            | в         |
| 1175      | 1           | ATSDECTO     | ESW SDE Command Transmit Timeout            | 0                          | No Timeout Error Occurred<br>Command Transmit Timeout Error Occured                   | в         |
| 1176      | 1           | ATSPECORR    | ESW Scan Phase Error Correction Transmitted | 0                          | No Scan Phase Correction was necessary<br>Scan Phase Error Correction was transmitted | в         |
| 1177      | 7           | ATSCLTLM     | ESW Safety Critical Limits Telemetry        | N/A                        | N/A                                                                                   | N/A       |
|           |             |              | RHI CHOILO B.                               |                            |                                                                                       |           |

# Table 4.1.8 ATMS Health and Status Engineering Packet User Data Fields (cont)

#### Diagnostic Data

Output of the ATMS diagnostic packet is not planned or anticipated under normal conditions. Enabling the diagnostic packet puts the ATMS into Diagnostic Mode but does not by itself change the Science APID. The diagnostic data packet is used to gain familiarity with the instrument on-orbit, or to gain additional information on any anomalous conditions. The ATMS diagnostic packet (APID 516) contains test channel data consisting of 148 samples of test data from the lower band shelves (KAV) and 148 samples from the upper band shelves (WG). The samples monitor stable reference signals to help determine whether signal contamination is pre- or post-detection. The ATMS outputs the diagnostic packet once every 8 seconds in Diagnostic mode. The fixed packet length is 622 octets. The structure of APID 516 is illustrated in Figure 4.1-9 and the user data fields are listed in Table 4.1.9.





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|           | Bit  |              |                                                     | Units             | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|--------------|-----------------------------------------------------|-------------------|--------------------------------------------------------|-----------|
| Start Bit | Size | Memonic Name | Description                                         | OR<br>State Value | OR<br>State Name                                       | Data Type |
| 0         | 16   | N/A          | Bytes 182 of LITC time code for Start of Scan time  | dav               | Ν/Α                                                    |           |
| 16        | 32   | N/A          | Bytes 3-6 of UTC time code for Start of Scan time   | msec of day       | N/A                                                    | Ŭ         |
| 48        | 16   | N/A          | Bytes 7&8 of UTC time code for Start of Scan time   | usec              | N/A                                                    | Ū         |
| 64        | 16   | N/A          | Bytes 1&2 of UTC time code for Scan Sync Pulse time | dav               | N/A                                                    | Ū         |
| 80        | 32   | N/A          | Bytes 3-6 of UTC time code for Scan Sync Pulse time | msec of day       | N/A                                                    | Ū         |
| 112       | 16   | N/A          | Bytes 7&8 of UTC time code for Scan Sync Pulse time | usec              | N/A                                                    | Ū         |
| 128       | 16   | N/A          | K. KA and V band test counts at position 1          | N/A               | N/A                                                    | Ŭ         |
| 144       | 16   | N/A          | W and G band test counts at position 1              | N/A               | N/A                                                    | U         |
| 160       | 16   | N/A          | K. KA and V band test counts at position 2          | N/A               | N/A                                                    | U         |
| 176       | 16   | N/A          | W and G band test counts at position 2              | N/A               | N/A                                                    | U         |
| 192       | 16   | N/A          | K. KA and V band test counts at position 3          | N/A               | N/A                                                    | U         |
| 208       | 16   | N/A          | W and G band test counts at position 3              | N/A               | N/A                                                    | U         |
| 224       | 16   | N/A          | K. KA and V band test counts at position 4          | N/A               | N/A                                                    | U         |
| 240       | 16   | N/A          | W and G band test counts at position 4              | N/A               | N/A                                                    | U         |
| 256       | 16   | N/A          | K. KA and V band test counts at position 5          | N/A               | N/A                                                    | Ū         |
| 272       | 16   | N/A          | W and G band test counts at position 5              | N/A               | N/A                                                    | Ŭ         |
| 288       | 16   | N/A          | K. KA and V band test counts at position 6          | N/A               | N/A                                                    | U         |
| 304       | 16   | N/A          | W and G band test counts at position 6              | N/A               | N/A                                                    | U         |
| 320       | 16   | N/A          | K. KA and V band test counts at position 7          | N/A               | N/A                                                    | Ū         |
| 336       | 16   | N/A          | W and G band test counts at position 7              | N/A               | N/A                                                    | Ū         |
| 352       | 16   | N/A          | K. KA and V band test counts at position 8          | N/A               | N/A                                                    | Ŭ         |
| 368       | 16   | N/A          | W and G band test counts at position 8              | N/A               | N/A                                                    | U         |
| 384       | 16   | N/A          | K. KA and V band test counts at position 9          | N/A               | N/A                                                    | Ū         |
| 400       | 16   | N/A          | W and G band test counts at position 9              | N/A               | N/A                                                    | Ū         |
| 416       | 16   | N/A          | K, KA and V band test counts at position 10         | N/A               | N/A                                                    | Ŭ         |
| 432       | 16   | N/A          | W and G band test counts at position 10             | N/A               | N/A                                                    | U         |
| 448       | 16   | N/A          | K, KA and V band test counts at position 11         | N/A               | N/A                                                    | U         |
| 464       | 16   | N/A          | W and G band test counts at position 11             | N/A               | N/A                                                    | U         |
| 480       | 16   | N/A          | K. KA and V band test counts at position 12         | N/A               | N/A                                                    | U         |
| 496       | 16   | N/A          | W and G band test counts at position 12             | N/A               | N/A                                                    | U         |
| 512       | 16   | N/A          | K, KA and V band test counts at position 13         | N/A               | N/A                                                    | U         |
| 528       | 16   | N/A          | W and G band test counts at position 13             | N/A               | N/A                                                    | U         |
| 544       | 16   | N/A          | K, KA and V band test counts at position 14         | N/A               | N/A                                                    | U         |
| 560       | 16   | N/A          | W and G band test counts at position 14             | N/A               | N/A                                                    | U         |
| 576       | 16   | N/A          | K, KA and V band test counts at position 15         | N/A               | N/A                                                    | U         |
| 592       | 16   | N/A          | W and G band test counts at position 15             | N/A               | N/A                                                    | U         |
| 608       | 16   | N/A          | K, KA and V band test counts at position 16         | N/A               | N/A                                                    | U         |
| 624       | 16   | N/A          | W and G band test counts at position 16             | N/A               | N/A                                                    | U         |
| 640       | 16   | N/A          | K, KA and V band test counts at position 17         | N/A               | N/A                                                    | U         |
| 656       | 16   | N/A          | W and G band test counts at position 17             | N/A               | N/A                                                    | U         |
| 672       | 16   | N/A          | K, KA and V band test counts at position 18         | N/A               | N/A                                                    | U         |
| 688       | 16   | N/A          | W and G band test counts at position 18             | N/A               | N/A                                                    | U         |
| 704       | 16   | N/A          | K, KA and V band test counts at position 19         | N/A               | N/A                                                    | U         |
| 720       | 16   | N/A          | W and G band test counts at position 19             | N/A               | N/A                                                    | U         |
|           |      |              |                                                     |                   |                                                        |           |
|           |      |              | $\mathbf{v}$                                        |                   |                                                        |           |

# Table 4.1.9 ATMS Diagnostic Packet User Data Fields

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| Table 4.1.9 | ATMS Diagnostic Packet User Data Fields ( | cont) |
|-------------|-------------------------------------------|-------|
|-------------|-------------------------------------------|-------|

| Start Bit | Bit<br>Size | Memonic Name | Description                                 | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Ty  | /pe |
|-----------|-------------|--------------|---------------------------------------------|----------------------------|----------------------------------------------------------------------------|----------|-----|
| 736       | 16          | N/A          | K KA and V hand test counts at position 20  | N/A                        | Ν/Δ                                                                        | 1 11     | _   |
| 752       | 16          | N/A          | W and G band test counts at position 20     | N/A                        | N/A                                                                        | Ŭ        | -   |
| 768       | 16          | N/A          | K. KA and V band test counts at position 21 | N/A                        | N/A                                                                        | Ū        | -   |
| 784       | 16          | N/A          | W and G band test counts at position 21     | N/A                        | N/A                                                                        | U        |     |
| 800       | 16          | N/A          | K, KA and V band test counts at position 22 | N/A                        | N/A                                                                        | U        | _   |
| 816       | 16          | N/A          | W and G band test counts at position 22     | N/A                        | N/A                                                                        | U        | -   |
| 832       | 16          | N/A          | K, KA and V band test counts at position 23 | N/A                        | N/A                                                                        | U        |     |
| 848       | 16          | N/A          | W and G band test counts at position 23     | N/A                        | N/A                                                                        | U        |     |
| 864       | 16          | N/A          | K, KA and V band test counts at position 24 | N/A                        | N/A                                                                        | U        |     |
| 880       | 16          | N/A          | W and G band test counts at position 24     | N/A                        | N/A                                                                        | U        | _   |
| 896       | 16          | N/A          | K, KA and V band test counts at position 25 | N/A                        | N/A                                                                        | 0        |     |
| 912       | 16          | N/A          | W and G band test counts at position 25     | N/A                        | N/A                                                                        | 0        |     |
| 920       | 10          | N/A          | W and G band test counts at position 20     | N/A                        | N/A<br>N/A                                                                 | <u> </u> | -   |
| 960       | 16          | N/A          | K KA and V band test counts at position 27  | N/A                        | N/A                                                                        | Ŭ        | -   |
| 976       | 16          | N/A          | W and G band test counts at position 27     | N/A                        | N/A                                                                        | U U      | -   |
| 002       | 16          | N/A          | K KA and V band test counts at position 28  | N/A                        | N/A<br>N/A                                                                 | <u> </u> | -   |
| 1009      | 10          | N/A<br>N/A   | W and C band test counts at position 20     | N/A                        | N/A<br>N/A                                                                 | 0        | -   |
| 1006      | 10          | N/A<br>N/A   | K KA end V band test counts at position 20  | N/A                        | N/A N/A                                                                    | 0        |     |
| 1024      | 10          | N/A          | N, KA and V band lest counts at position 29 | N/A                        | N/A N/A                                                                    | 0        | _   |
| 1040      | 10          | N/A          | Wand G band test counts at position 29      | N/A                        | N/A                                                                        | 0        | _   |
| 1056      | 16          | N/A          | K, KA and v band test counts at position 30 | N/A                        | N/A                                                                        | 0        |     |
| 1072      | 16          | N/A          | W and G band test counts at position 30     | N/A                        | N/A                                                                        | 0        |     |
| 1088      | 16          | N/A          | K, KA and V band test counts at position 31 | N/A                        | N/A                                                                        | U        |     |
| 1104      | 16          | N/A          | W and G band test counts at position 31     | N/A                        | N/A                                                                        | U        |     |
| 1120      | 16          | N/A          | K, KA and V band test counts at position 32 | N/A                        | N/A                                                                        | U        |     |
| 1136      | 16          | N/A          | W and G band test counts at position 32     | N/A                        | N/A                                                                        | U        |     |
| 1152      | 16          | N/A          | K, KA and V band test counts at position 33 | N/A                        | N/A                                                                        | U        |     |
| 1168      | 16          | N/A          | W and G band test counts at position 33     | N/A                        | N/A                                                                        | U        |     |
| 1184      | 16          | N/A          | K, KA and V band test counts at position 34 | N/A                        | N/A                                                                        | U        |     |
| 1200      | 16          | N/A          | W and G band test counts at position 34     | N/A                        | N/A                                                                        | U        | _   |
| 1216      | 16          | N/A          | K, KA and V band test counts at position 35 | N/A                        | N/A                                                                        | U        |     |
| 1232      | 16          | N/A          | W and G band test counts at position 35     | N/A                        | N/A                                                                        | U        |     |
| 1248      | 16          | N/A          | K, KA and V band test counts at position 36 | N/A                        | N/A                                                                        | U        |     |
| 1264      | 16          | N/A          | W and G band test counts at position 36     | N/A                        | N/A                                                                        | U        |     |
| 1280      | 16          | N/A          | K. KA and V band test counts at position 37 | N/A                        | N/A                                                                        | U        |     |
| 1296      | 16          | N/A          | W and G band test counts at position 37     | N/A                        | N/A                                                                        | U        |     |
| 1312      | 16          | N/A          | K KA and V band test counts at position 38  | N/A                        | N/A                                                                        | Ū        | -   |
| 1328      | 16          | N/A          | W and G band test counts at position 38     | N/A                        | N/A                                                                        | Ŭ        | -   |
| 1344      | 16          | N/A          | K KA and V han test counts at position 39   | N/A                        | N/A                                                                        | U U      | -   |
| 1360      | 16          | N/A          | W and C band test counts at position 39     | N/A                        | N/Δ                                                                        | U U      | -   |
| 1376      | 16          | N/A          | K KA and V hand test counts at position 40  | N/A                        | N/A                                                                        | U U      | -   |
| 1202      | 10          | N/A          | W and C band test counts at position 40     | N/A                        | N/A                                                                        | - ŭ      | -   |
| 1400      | 10          | N/A          | Wand G band test counts at position 40      | N/A                        | N/A                                                                        | 0        | -   |
| 1400      | 10          | N/A          | N, A and V band test counts at position 41  | N/A                        | N/A                                                                        | 0        | _   |
| 1424      | 10          | N/A          | W and G band test counts at position 41     | N/A                        | N/A                                                                        | 0        | _   |
| 1440      | 16          | N/A          | K, KA and V band test counts at position 42 | N/A                        | N/A                                                                        | U        |     |
|           |             |              | BHUCH                                       |                            |                                                                            |          |     |

| Start Bit | Bit  | Memonic Name | Description                                 | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR | Data - | Гуре |
|-----------|------|--------------|---------------------------------------------|-------------|--------------------------------------------------------------|--------|------|
|           | Size |              |                                             | State Value | State Name                                                   |        |      |
| 1456      | 16   | N/A          | W and G band test counts at position4 2     | N/A         | N/A                                                          | U      |      |
| 1472      | 16   | N/A          | K, KA and V band test counts at position 43 | N/A         | N/A                                                          | U      |      |
| 1488      | 16   | N/A          | W and G band test counts at position 43     | N/A         | N/A                                                          | U      |      |
| 1504      | 16   | N/A          | K, KA and V band test counts at position 44 | N/A         | N/A                                                          | U      |      |
| 1520      | 16   | N/A          | W and G band test counts at position 44     | N/A         | N/A                                                          | U      |      |
| 1536      | 16   | N/A          | K, KA and V band test counts at position 45 | N/A         | N/A                                                          | U      |      |
| 1552      | 16   | N/A          | W and G band test counts at position 45     | N/A 🚄       | N/A                                                          | U      |      |
| 1568      | 16   | N/A          | K, KA and V band test counts at position 46 | N/A         | N/A                                                          | U      |      |
| 1584      | 16   | N/A          | W and G band test counts at position 46     | N/A         | N/A                                                          | U      |      |
| 1600      | 16   | N/A          | K, KA and V band test counts at position 47 | N/A         | N/A                                                          | U      |      |
| 1616      | 16   | N/A          | W and G band test counts at position 47     | N/A         | N/A                                                          | U      |      |
| 1632      | 16   | N/A          | K, KA and V band test counts at position 48 | N/A         | N/A                                                          | U      |      |
| 1648      | 16   | N/A          | W and G band test counts at position 48     | N/A         | N/A                                                          | U      |      |
| 1664      | 16   | N/A          | K, KA and V band test counts at position 49 | N/A         | N/A                                                          | U      |      |
| 1680      | 16   | N/A          | W and G band test counts at position 49     | N/A         | N/A                                                          | U      |      |
| 1696      | 16   | N/A          | K, KA and V band test counts at position 50 | N/A         | N/A                                                          | U      |      |
| 1712      | 16   | N/A          | W and G band test counts at position 50     | N/A         | N/A                                                          | U      |      |
| 1728      | 16   | N/A          | K, KA and V band test counts at position 51 | N/A         | N/A                                                          | U      |      |
| 1744      | 16   | N/A          | W and G band test counts at position 51     | N/A         | N/A                                                          | U      |      |
| 1760      | 16   | N/A          | K, KA and V band test counts at position 52 | N/A         | N/A                                                          | U      |      |
| 1776      | 16   | N/A          | W and G band test counts at position 52     | N/A         | N/A                                                          | U      |      |
| 1792      | 16   | N/A          | K, KA and V band test counts at position 53 | N/A         | N/A                                                          | U      |      |
| 1808      | 16   | N/A          | W and G band test counts at position 53     | N/A         | N/A                                                          | U      |      |
| 1824      | 16   | N/A          | K, KA and V band test counts at position 54 | N/A         | N/A                                                          | U      |      |
| 1840      | 16   | N/A          | W and G band test counts at position 54     | N/A         | N/A                                                          | U      |      |
| 1856      | 16   | N/A          | K, KA and V band test counts at position 55 | N/A         | N/A                                                          | U      |      |
| 1872      | 16   | N/A          | W and G band test counts at position 55     | N/A         | N/A                                                          | U      |      |
| 1888      | 16   | N/A          | K, KA and V band test counts at position 56 | N/A         | N/A                                                          | U      |      |
| 1904      | 16   | N/A          | W and G band test counts at position 56     | N/A         | N/A                                                          | U      |      |
| 1920      | 16   | N/A          | K, KA and V band test counts at position 57 | N/A         | N/A                                                          | U      |      |
| 1936      | 16   | N/A          | W and G band test counts at position 57     | N/A         | N/A                                                          | U      |      |
| 1952      | 16   | N/A          | K, KA and V band test counts at position 58 | N/A         | N/A                                                          | U      |      |
| 1968      | 16   | N/A          | W and G band test counts at position 58     | N/A         | N/A                                                          | U      |      |
| 1984      | 16   | N/A          | K, KA and V band test counts at position 59 | N/A         | N/A                                                          | U      |      |
| 2000      | 16   | N/A          | W and G band test counts at position 59     | N/A         | N/A                                                          | U      |      |
| 2016      | 16   | N/A          | K, KA and V band test counts at position 60 | N/A         | N/A                                                          | U      |      |
| 2032      | 16   | N/A          | W and G band test counts at position 60     | N/A         | N/A                                                          | U      |      |
| 2048      | 16   | N/A          | K, KA and V band test counts at position 61 | N/A         | N/A                                                          | U      |      |
| 2064      | 16   | N/A          | W and G band test counts at position 61     | N/A         | N/A                                                          | U      |      |
| 2080      | 16   | N/A          | K, KA and V band test counts at position 62 | N/A         | N/A                                                          | U      | _    |
| 2096      | 16   | N/A          | W and G band test counts at position 62     | N/A         | N/A                                                          | U      | _    |
| 2112      | 16   | N/A          | K, KA and V band test counts at position 63 | N/A         | N/A                                                          | U      |      |
| 2128      | 16   | N/A          | W and G band test counts at position 63     | N/A         | N/A                                                          | U      |      |
| 2144      | 16   | N/A          | K, KA and V band test counts at position 64 | N/A         | N/A                                                          | U      |      |

# Table 4.1.9 ATMS Diagnostic Packet User Data Fields (cont)

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

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| Table 4.1.9 | ATMS Diagnostic Packet User Data Fields ( | cont) |
|-------------|-------------------------------------------|-------|
|-------------|-------------------------------------------|-------|

| Start Bit | Bit<br>Size | Memonic Name | Description                                   | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR | Data Type |
|-----------|-------------|--------------|-----------------------------------------------|-------------|--------------------------------------------------------------|-----------|
|           |             |              |                                               | State Value | State Name                                                   |           |
| 2160      | 16          | N/A          | W and G band test counts at position 64       | N/A         | N/A                                                          | U         |
| 2176      | 16          | N/A          | K, KA and V band test counts at position 65   | N/A         | N/A                                                          | U         |
| 2192      | 16          | N/A          | W and G band test counts at position 65       | N/A         | N/A                                                          | U         |
| 2208      | 16          | N/A          | K, KA and V band test counts at position 66   | N/A         | N/A                                                          | U         |
| 2224      | 16          | N/A          | W and G band test counts at position 66       | N/A         | N/A                                                          | U         |
| 2240      | 16          | N/A          | K, KA and V band test counts at position 67   | N/A         | N/A                                                          | U         |
| 2256      | 16          | N/A          | W and G band test counts at position 67       | N/A 🚽       | N/A                                                          | U         |
| 2272      | 16          | N/A          | K, KA and V band test counts at position 68   | N/A         | N/A                                                          | U         |
| 2288      | 16          | N/A          | W and G band test counts at position 68       | N/A         | N/A                                                          | U         |
| 2304      | 16          | N/A          | K, KA and V band test counts at position 69   | N/A         | N/A                                                          | U         |
| 2320      | 16          | N/A          | W and G band test counts at position 69       | N/A         | N/A                                                          | U         |
| 2336      | 16          | N/A          | K, KA and V band test counts at position 70   | N/A         | N/A                                                          | U         |
| 2352      | 16          | N/A          | W and G band test counts at position 70       | N/A         | N/A                                                          | U         |
| 2368      | 16          | N/A          | K. KA and V band test counts at position 71   | N/A         | N/A                                                          | U         |
| 2384      | 16          | N/A          | W and G band test counts at position 71       | N/A         | N/A                                                          | U         |
| 2400      | 16          | N/A          | K. KA and V band test counts at position 72   | N/A         | N/A                                                          | Ū         |
| 2416      | 16          | N/A          | W and G band test counts at position 72       | N/A         | N/A                                                          | Ŭ         |
| 2432      | 16          | N/A          | K KA and V band test counts at position 73    | N/A         | N/A                                                          | Ū         |
| 2448      | 16          | N/A          | W and G band test counts at position 73       | N/A         | N/A                                                          | Ū         |
| 2464      | 16          | N/A          | K. KA and V band test counts at position 74   | N/A         | N/A                                                          | U         |
| 2480      | 16          | N/A          | W and G band test counts at position 74       | N/A         | N/A                                                          | U         |
| 2496      | 16          | N/A          | K, KA and V band test counts at position 75   | N/A         | N/A                                                          | U         |
| 2512      | 16          | N/A          | W and G band test counts at position 75       | N/A         | N/A                                                          | U         |
| 2528      | 16          | N/A          | K, KA and V band test counts at position 76   | N/A         | N/A                                                          | U         |
| 2544      | 16          | N/A          | W and G band test counts at position 76       | N/A         | N/A                                                          | U         |
| 2560      | 16          | N/A          | K, KA and V band test counts at position 77   | N/A         | N/A                                                          | U         |
| 2576      | 16          | N/A          | W and G band test counts at position 77       | N/A         | N/A                                                          | U         |
| 2592      | 16          | N/A          | K, KA and V band test counts at position 78   | N/A         | N/A                                                          | U         |
| 2608      | 16          | N/A          | W and G band test counts at position 78       | N/A         | N/A                                                          | U         |
| 2624      | 16          | N/A          | K, KA and V band test counts at position 79   | N/A         | N/A                                                          | U         |
| 2640      | 16          | N/A          | W and G band test counts at position 79       | N/A         | N/A                                                          | U         |
| 2656      | 16          | N/A          | K, KA and V band test counts at position 80   | N/A         | N/A                                                          | U         |
| 2672      | 16          | N/A          | W and G band test counts at position 80       | N/A         | N/A                                                          | U         |
| 2688      | 16          | N/A          | K, KA and V band test counts at position 81   | N/A         | N/A                                                          | U         |
| 2704      | 16          | N/A          | W and G band test counts at position 81       | N/A         | N/A                                                          | U         |
| 2720      | 16          | N/A          | K, KA and V band test counts at position 82   | N/A         | N/A                                                          | U         |
| 2736      | 16          | N/A          | W and G band test counts at position 82       | N/A         | N/A                                                          | U         |
| 2752      | 16          | N/A          | K, KA and V band test counts at position 83   | N/A         | N/A                                                          | U         |
| 2/68      | 16          | N/A          | w and G band test counts at postion 83        | N/A         | N/A                                                          |           |
| 2/84      | 16          | N/A          | K, KA and V band test counts at position 84   | N/A         | N/A                                                          | <u> </u>  |
| 2800      | 16          | N/A          | W and G band test counts at position 84       | N/A         | N/A                                                          | U         |
| 2010      | 10          | N/A<br>N/A   | N, NA allu V ballu test counts at position 65 | N/A<br>N/A  | IN/A<br>N/A                                                  |           |
| 2032      | 10          | N/A          | W KA and V band test counts at position of    | N/A<br>N/A  | IN/A<br>N/A                                                  |           |
| 2040      | 10          | IN/A         | N, NA and V band test counts at position 60   | IN/A        | IN/A                                                         | 0         |

K, KA and

| Table 4.1.9 | ATMS Diagnostic Pac | ket User Data Fields (cont) |
|-------------|---------------------|-----------------------------|
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| Start Bit | Bit<br>Size | Memonic Name | Description                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data 1 | Гуре |
|-----------|-------------|--------------|----------------------------------------------|----------------------------|----------------------------------------------------------------------------|--------|------|
| 2864      | 16          | N/A          | W and G band test counts at position 86      | N/A                        | N/A                                                                        | U      |      |
| 2880      | 16          | N/A          | K, KA and V band test counts at position 87  | N/A                        | N/A                                                                        | U      |      |
| 2896      | 16          | N/A          | W and G band test counts at position 87      | N/A                        | N/A                                                                        | U      |      |
| 2912      | 16          | N/A          | K, KA and V band test counts at position 88  | N/A                        | N/A                                                                        | U      |      |
| 2928      | 16          | N/A          | W and G band test counts at position 88      | N/A                        | N/A                                                                        | U      | _    |
| 2944      | 16          | N/A          | K, KA and V band test counts at position 89  | N/A                        | N/A                                                                        | U      | _    |
| 2960      | 16          | N/A          | W and G band test counts at position 89      | N/A                        | N/A                                                                        | U      | -    |
| 2976      | 16          | N/A          | K, KA and V band test counts at position 90  | N/A 🚽                      | N/A                                                                        | U      | -    |
| 2992      | 16          | N/A          | W and G band test counts at position 90      | N/A                        | N/A                                                                        | U      | _    |
| 3008      | 16          | N/A          | K. KA and V band test counts at position 91  | N/A                        | N/A                                                                        | U      | _    |
| 3024      | 16          | N/A          | W and G band test counts at position 91      | N/A                        | N/A                                                                        | Ŭ      | _    |
| 3040      | 16          | N/A          | K KA and V band test counts at position 92   | N/A                        | N/A                                                                        | Ū      | _    |
| 3056      | 16          | N/A          | W and G band test counts at position 92      | N/A                        | N/Δ                                                                        | Ŭ      | _    |
| 3072      | 16          | N/A          | K KA and V hand test counts at position 93   | N/A                        | N/Δ                                                                        | - ŭ    | -    |
| 2099      | 16          | N/A          | Wand G band test counts at position 93       | N/A                        | N/A                                                                        | - ň    |      |
| 2104      | 10          | N/A          | W and od V hand test counts at position 04   | N/A                        | N/A                                                                        |        |      |
| 3104      | 10          | N/A          | N and C band test counts at position 94      | N/A                        | N/A                                                                        | 0      |      |
| 3120      | 10          | N/A<br>N/A   | Walled bland test counts at position 94      | N/A                        | N/A                                                                        | 0      |      |
| 3130      | 10          | N/A          | K, KA and V band test counts at position 95  | N/A                        | N/A                                                                        | 0      |      |
| 3152      | 16          | N/A          | W and G band test counts at position 95      | N/A                        | N/A                                                                        | 0      |      |
| 3168      | 16          | N/A          | K, KA and V band test counts at position 96  | N/A                        | N/A                                                                        | 0      |      |
| 3184      | 16          | N/A          | W and G band test counts at position 96      | N/A                        | N/A                                                                        | U      |      |
| 3200      | 16          | N/A          | K, KA and V band test counts at position 97  | N/A                        | N/A                                                                        | U      |      |
| 3216      | 16          | N/A          | W and G band test counts at position 97      | N/A                        | N/A                                                                        | U      |      |
| 3232      | 16          | N/A          | K, KA and V band test counts at position 98  | N/A                        | N/A                                                                        | U      | _    |
| 3248      | 16          | N/A          | W and G band test counts at position 98      | N/A                        | N/A                                                                        | U      |      |
| 3264      | 16          | N/A          | K, KA and V band test counts at position 99  | N/A                        | N/A                                                                        | U      | _    |
| 3280      | 16          | N/A          | W and G band test counts at position 99      | N/A                        | N/A                                                                        | U      | _    |
| 3296      | 16          | N/A          | K, KA and V band test counts at position 100 | N/A                        | N/A                                                                        | U      |      |
| 3312      | 16          | N/A          | W and G band test counts at position 100     | N/A                        | N/A                                                                        | U      | _    |
| 3328      | 16          | N/A          | K. KA and V band test counts at position 101 | N/A                        | N/A                                                                        | U      | _    |
| 3344      | 16          | N/A          | W and G band test counts at position 101     | N/A                        | N/A                                                                        | U      | _    |
| 3360      | 16          | N/A          | K KA and V band test counts at position 102  | N/A                        | N/A                                                                        | U      | _    |
| 3376      | 16          | N/A          | W and G band test counts at position 102     | N/A                        | N/A                                                                        | Ū      | _    |
| 3392      | 16          | N/A          | K KA and V hand test counts at position 103  | N/A                        | N/A                                                                        | Ŭ      | _    |
| 3408      | 16          | N/A          | W and G band test counts at position 103     | N/A                        | N/A                                                                        | Ŭ      | _    |
| 3424      | 16          | N/A          | K KA and V hand test counts at position 104  | N/A                        | N/A                                                                        | - ň    |      |
| 2440      | 16          | N/A          | W and G band test courts at position 104     | N/A                        | N/A                                                                        | - ii   |      |
| 2456      | 16          | N/A          | K KA and V band toot counts at position 105  | N/A                        | N/A                                                                        | - ii   |      |
| 3430      | 10          | N/A          | We and C band test counts at position 105    | N/A                        | N/A                                                                        |        |      |
| 3472      | 10          | N/A          | W and Grand test counts at position 100      | N/A                        | N/A                                                                        |        |      |
| 3488      | 10          | N/A          | K, KA and V band test courts at position 100 | IN/A                       | N/A                                                                        | 0      |      |
| 3504      | 10          | N/A          | W and 6 band test counts at position 100     | IN/A                       | N/A                                                                        | 0      |      |
| 3520      | 16          | N/A          | K, KA and V band test counts at position 107 | N/A                        | N/A                                                                        | 0      |      |
| 3536      | 16          | N/A          | W and G band test counts at position 107     | N/A                        | N/A                                                                        | 0      |      |
|           |             |              | RHI CHOITE                                   |                            |                                                                            |        |      |

| Table 4.1.9 | ATMS Diagnostic Packet User Data Fields ( | cont) |
|-------------|-------------------------------------------|-------|
|-------------|-------------------------------------------|-------|

| Start Bit | Bit<br>Size | Memonic Name | Description                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data T | уре |
|-----------|-------------|--------------|----------------------------------------------|----------------------------|----------------------------------------------------------------------------|--------|-----|
| 3568      | 16          | N/A          | W and G band test counts at position 108     | N/A                        | N/A                                                                        | U      |     |
| 3584      | 16          | N/A          | K, KA and V band test counts at position 109 | N/A                        | N/A                                                                        | U      |     |
| 3600      | 16          | N/A          | W and G band test counts at position 109     | N/A                        | N/A                                                                        | U      |     |
| 3616      | 16          | N/A          | K, KA and V band test counts at position 110 | N/A                        | N/A                                                                        | U      |     |
| 3632      | 16          | N/A          | W and G band test counts at position 110     | N/A                        | N/A                                                                        | U      |     |
| 3648      | 16          | N/A          | K. KA and V band test counts at position 111 | N/A                        | N/A                                                                        | Ú      | -   |
| 3664      | 16          | N/A          | W and G band test counts at position 111     | N/A                        | N/A                                                                        | U      |     |
| 3680      | 16          | N/A          | K KA and V band test counts at position 112  | N/A                        | N/A                                                                        | Ū      |     |
| 3696      | 16          | N/A          | W and G band test counts at position 112     | N/A                        | N/A                                                                        | Ŭ      |     |
| 3712      | 16          | N/A          | K KA and V band test counts at nosition 113  | N/A                        | Ν/Δ                                                                        | - ŭ    |     |
| 3729      | 16          | N/A          | W and G band test counts at position 113     | N/A                        | N/A                                                                        | - ň    | _   |
| 2744      | 10          | N/A          | K KA and V band test counts at position 114  | N/A                        | N/A                                                                        | - ii   |     |
| 2760      | 10          | N/A          | Wand C band test counts at position 114      | N/A                        | N/A                                                                        | - ñ    |     |
| 3760      | 10          | N/A          | W and G band test counts at position 114     | N/A                        | N/A                                                                        |        |     |
| 3//6      | 10          | N/A          | K, KA and V band test counts at position 115 | IN/A                       | N/A                                                                        | 0      |     |
| 3792      | 16          | N/A          | W and G band test counts at position 115     | N/A                        | N/A                                                                        | 0      |     |
| 3808      | 16          | N/A          | K, KA and V band test counts at position 116 | N/A                        | N/A                                                                        | U      |     |
| 3824      | 16          | N/A          | W and G band test counts at position 116     | N/A                        | N/A                                                                        | U      |     |
| 3840      | 16          | N/A          | K, KA and V band test counts at position 117 | N/A                        | N/A                                                                        | U      |     |
| 3856      | 16          | N/A          | W and G band test counts at position 117     | N/A                        | N/A                                                                        | U      |     |
| 3872      | 16          | N/A          | K, KA and V band test counts at position 118 | N/A                        | N/A                                                                        | U      |     |
| 3888      | 16          | N/A          | W and G band test counts at position 118     | N/A                        | N/A                                                                        | U      |     |
| 3904      | 16          | N/A          | K, KA and V band test counts at position 119 | N/A                        | N/A                                                                        | U      |     |
| 3920      | 16          | N/A          | W and G band test counts at position 119     | N/A                        | N/A                                                                        | U      |     |
| 3936      | 16          | N/A          | K. KA and V band test counts at position 120 | N/A                        | N/A                                                                        | U      | _   |
| 3952      | 16          | N/A          | W and G band test counts at position 120     | N/A                        | N/A                                                                        | U      | _   |
| 3968      | 16          | N/A          | K KA and V band test counts at position 121  | N/A                        | N/A                                                                        | Ú      |     |
| 3984      | 16          | N/A          | W and G band test counts at position 121     | N/A                        | N/A                                                                        | Ū      |     |
| 4000      | 16          | N/A          | K KA and V band test counts at position 122  | N/A                        | N/A                                                                        | Ŭ      | -   |
| 4016      | 16          | N/A          | W and G band test counts at position 122     | N/A                        | N/Δ                                                                        | ŭ      | -   |
| 4010      | 16          | N/A          | K KA and V band test counts at position 122  | N/A                        | N/A                                                                        | - ň    |     |
| 4032      | 10          | N/A          | Wand C band test counts at position 122      | N/A                        | N/A                                                                        |        | -   |
| 4040      | 10          | N/A          | K KA and V band test counts at position 125  | N/A<br>N/A                 | N/A                                                                        | 0      |     |
| 4064      | 10          | N/A          | N A and V band test counts at position 124   | IN/A                       | N/A                                                                        | 0      |     |
| 4000      | 10          | N/A          | W and 6 band test counts at position 124     | N/A                        | N/A                                                                        |        |     |
| 4096      | 10          | N/A          | K, KA and V band test courts at position 125 | N/A                        | N/A                                                                        | 0      |     |
| 4112      | 16          | N/A          | W and G band test counts at position 125     | N/A                        | N/A                                                                        | 0      |     |
| 4128      | 16          | N/A          | K, KA and V band test counts at position 126 | N/A                        | N/A                                                                        | U      |     |
| 4144      | 16          | N/A          | W and G band test counts at position 126     | N/A                        | N/A                                                                        | U      |     |
| 4160      | 16          | N/A          | K, KA and V band test counts at position 127 | N/A                        | N/A                                                                        | U      |     |
| 4176      | 16          | N/A          | W and G band test counts at position 127     | N/A                        | N/A                                                                        | U      |     |
| 4192      | 16          | N/A          | K, KA and V band test counts at position 128 | N/A                        | N/A                                                                        | U      |     |
| 4208      | 16          | N/A          | W and G band test counts at position 128     | N/A                        | N/A                                                                        | U      |     |
| 4224      | 16          | N/A          | K, KA and V band test counts at position 129 | N/A                        | N/A                                                                        | U      |     |
| 4240      | 16          | N/A          | W and G band test counts at position 129     | N/A                        | N/A                                                                        | U      |     |
| 4256      | 16          | N/A          | K, KA and V band test counts at position 130 | N/A                        | N/A                                                                        | U      |     |
|           |             |              | RHUMB                                        |                            |                                                                            |        |     |

| Table 4.1.9 | ATMS Diagnostic Packet User Data Fields ( | cont) |
|-------------|-------------------------------------------|-------|
|-------------|-------------------------------------------|-------|

| Start Bit | Bit<br>Size | Memonic Name | Description                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|--------------|----------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 4272      | 16          | N/A          | W and G band test counts at position 130     | N/A                        | N/A                                                                        | U         |
| 4288      | 16          | N/A          | K, KA and V band test counts at position 131 | N/A                        | N/A                                                                        | U         |
| 4304      | 16          | N/A          | W and G band test counts at position 131     | N/A                        | N/A                                                                        | U         |
| 4320      | 16          | N/A          | K, KA and V band test counts at position 132 | N/A                        | N/A                                                                        | U         |
| 4336      | 16          | N/A          | W and G band test counts at position 13 2    | N/A                        | N/A                                                                        | U         |
| 4352      | 16          | N/A          | K, KA and V band test counts at position 133 | N/A                        | N/A                                                                        | U         |
| 4368      | 16          | N/A          | W and G band test counts at position 133     | N/A                        | N/A                                                                        | U         |
| 4384      | 16          | N/A          | K, KA and V band test counts at position 134 | N/A                        | N/A                                                                        | U         |
| 4400      | 16          | N/A          | W and G band test counts at position 134     | N/A                        | N/A                                                                        | U         |
| 4416      | 16          | N/A          | K, KA and V band test counts at position 135 | N/A                        | N/A                                                                        | U         |
| 4432      | 16          | N/A          | W and G band test counts at position 135     | N/A                        | N/A                                                                        | U         |
| 4448      | 16          | N/A          | K, KA and V band test counts at position 136 | N/A                        | N/A                                                                        | U         |
| 4464      | 16          | N/A          | W and G band test counts at position 136     | N/A                        | N/A                                                                        | U         |
| 4480      | 16          | N/A          | K, KA and V band test counts at position 137 | N/A                        | N/A                                                                        | U         |
| 4496      | 16          | N/A          | W and G band test counts at position 137     | N/A                        | N/A                                                                        | U         |
| 4512      | 16          | N/A          | K, KA and V band test counts at position 138 | N/A                        | N/A                                                                        | U         |
| 4528      | 16          | N/A          | W and G band test counts at position 138     | N/A                        | N/A                                                                        | U         |
| 4544      | 16          | N/A          | K. KA and V band test counts at position 139 | N/A                        | N/A                                                                        | U         |
| 4560      | 16          | N/A          | W and G band test counts at position 139     | N/A                        | N/A                                                                        | U         |
| 4576      | 16          | N/A          | K. KA and V band test counts at position 140 | N/A                        | N/A                                                                        | U         |
| 4592      | 16          | N/A          | W and G band test counts at position 140     | N/A                        | N/A                                                                        | U         |
| 4608      | 16          | N/A          | K. KA and V band test counts at position 141 | N/A                        | N/A                                                                        | U         |
| 4624      | 16          | N/A          | W and G band test counts at position 141     | N/A                        | N/A                                                                        | U         |
| 4640      | 16          | N/A          | K. KA and V band test counts at position 142 | N/A                        | N/A                                                                        | U         |
| 4656      | 16          | N/A          | W and G band test counts at position 142     | N/A                        | N/A                                                                        | U         |
| 4672      | 16          | N/A          | K. KA and V band test counts at position 143 | N/A                        | N/A                                                                        | U         |
| 4688      | 16          | N/A          | W and G band test counts at position 143     | N/A                        | N/A                                                                        | U         |
| 4704      | 16          | N/A          | K. KA and V band test counts at position 144 | N/A                        | N/A                                                                        | U         |
| 4720      | 16          | N/A          | W and G band test counts at position 144     | N/A                        | N/A                                                                        | Ū         |
| 4736      | 16          | N/A          | K. KA and V band test counts at position 145 | N/A                        | N/A                                                                        | U         |
| 4752      | 16          | N/A          | W and G band test counts at position 145     | N/A                        | N/A                                                                        | Ū         |
| 4768      | 16          | N/A          | K KA and V band test counts at position 146  | N/A                        | N/A                                                                        | Ū         |
| 4784      | 16          | N/A          | W and G band test counts at position 146     | N/A                        | N/A                                                                        | Ū         |
| 4800      | 16          | N/A          | K KA and V band test counts at position 147  | N/A                        | N/A                                                                        | Ū         |
| 4816      | 16          | N/A          | W and G band test counts at position 147     | N/A                        | N/A                                                                        | Ū         |
| 4832      | 16          | N/A          | K. KA and V band test counts at position 148 | N/A                        | N/A                                                                        | Ŭ         |
| 4848      | 16          | N/A          | W and G band test counts at position 148     | N/A                        | N/A                                                                        | Ū         |

W and G band test counts at po

### Dwell Data

The ATMS instrument reports selected housekeeping telemetry channels at the same rate as a radiometric signal channel (up to 55.5 Hz) in the dwell packet. The telemetry item is commanded to be one of the following Data Word Numbers from the Engineering Data – Health and Status packet:

| Data Word Number | Telemetry Mnemonic                            |
|------------------|-----------------------------------------------|
| 2 to 25          | SPA_P5V_A_VMON(SPA_P5V_B_VMON) thru G2_IF_PRT |
| 30 to 47         | RCVPS_A_PRT thru 2W_GND_A(2W_GND_B)           |
| 56 to 72         | SD_P5V_VMON thru SD_MODE_ERRORS               |
|                  |                                               |

The Dwell data packet, APID 517, is sent once every 8/3 seconds after a command request when the ATMS is in diagnostic mode. It has a fixed length of 312 octets. The structure of APID 517 is illustrated in Figure 4.1-10 and the user data fields are listed in Table 4.1.10.

| AIMS Dwell Telemetry Packet | ATMS | Dwell | Telemetry | Packet |  |
|-----------------------------|------|-------|-----------|--------|--|
|-----------------------------|------|-------|-----------|--------|--|

VERSION C DATE: 8/1/2004

| Fixed | Packet | Length | 312 | Octets |
|-------|--------|--------|-----|--------|

| [      | PACKET P              | RIMARY HEAD           | ER                 |            |                      |                   |                    | SECONDARY        |                                  |                                                 | User Dat                                            | a Field                                                  |                            | ]    |
|--------|-----------------------|-----------------------|--------------------|------------|----------------------|-------------------|--------------------|------------------|----------------------------------|-------------------------------------------------|-----------------------------------------------------|----------------------------------------------------------|----------------------------|------|
|        | Verson<br>No.         | Packet Id             | lentificati        | on         | Packet Se<br>Control | equence<br>(PSC)  | Packet<br>Length   | HEADER           | ATMS Dwel                        | l Telemetry                                     |                                                     |                                                          |                            |      |
|        |                       | Type<br>Indicato<br>r | Sec Hdr<br>Flag    | APID       | Sequence<br>Flags    | Sequence<br>Count |                    | Start of<br>Data | Telemetry<br>Item Word<br>Number | Dwell<br>Sample<br>No. 1                        | Dwell<br>Sample<br>No. 2                            | Dwell Sample No.<br>3 to 147<br>                         | Dwell<br>Sample<br>No. 148 | TOTA |
| its    | 3                     | 1                     | 1                  | 11         | 2                    | 14                | 16                 | 64               | 16                               | 16                                              | 16                                                  | 2320                                                     | 16                         | 2496 |
| ctets  | 2                     |                       |                    |            | 2                    |                   | 2                  | 8                | 2                                | 2                                               | 2                                                   | 290                                                      | 2                          | 312  |
| alue   | 000                   | 0 /                   | 11                 | 20516      | 11                   | 00                | 13116              | varies           | \varies                          | varies                                          | varies                                              | varies                                                   | varies                     |      |
| 0<br>P | = Telemetry<br>Packet |                       | Seconda<br>Present | ary Header |                      | Standalone Pa     | icket CCSE<br>Segm | DS Day<br>lented |                                  | This is the wo<br>Housekeeping<br>Valid Range = | rd number in ti<br>g, LEO&A and<br>= 2-25, 30-47, § | he corresponding<br>Health and Status packets.<br>56-72. |                            | -    |



# Table 4.1.10 ATMS Dwell Packet User Data Fields

| Start Bit | Bit<br>Size | Memonic Name | Description           | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|--------------|-----------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 16          | N/A          | Telemetry Item Word # | N/A                        | N/A                                                                        | U         |
| 16        | 16          | N/A          | Dwell Sample No. 1    | N/A                        | N/A                                                                        | U         |
| 32        | 16          | N/A          | Dwell Sample No. 2    | N/A                        | N/A                                                                        | U         |
| 48        | 16          | N/A          | Dwell Sample No. 3    | N/A                        | N/A                                                                        | U         |
| 64        | 16          | N/A          | Dwell Sample No. 4    | N/A                        | N/A                                                                        | U         |
| 80        | 16          | N/A          | Dwell Sample No. 5    | N/A                        | N/A                                                                        | U         |
| 96        | 16          | N/A          | Dwell Sample No. 6    | N/A                        | N/A                                                                        | U         |
| 112       | 16          | N/A          | Dwell Sample No. 7    | N/A                        | N/A                                                                        | U         |
| 128       | 16          | N/A          | Dwell Sample No. 8    | N/A                        | N/A                                                                        | U         |
| 144       | 16          | N/A          | Dwell Sample No. 9    | N/A                        | N/A                                                                        | U         |
| 160       | 16          | N/A          | Dwell Sample No. 10   | N/A                        | N/A                                                                        | U         |
| 176       | 16          | N/A          | Dwell Sample No. 11   | N/A                        | N/A                                                                        | U         |
| 192       | 16          | N/A          | Dwell Sample No. 12   | N/A                        | N/A                                                                        | U         |
| 208       | 16          | N/A          | Dwell Sample No. 13   | N/A                        | N/A                                                                        | U         |
| 224       | 16          | N/A          | Dwell Sample No. 14   | N/A                        | N/A                                                                        | U         |
| 240       | 16          | N/A          | Dwell Sample No. 15   | N/A                        | N/A                                                                        | U         |
| 256       | 16          | N/A          | Dwell Sample No. 16   | N/A                        | N/A                                                                        | U         |
| 272       | 16          | N/A          | Dwell Sample No. 17   | N/A                        | N/A                                                                        | U         |
| 288       | 16          | N/A          | Dwell Sample No. 18   | N/A                        | N/A                                                                        | U         |
| 304       | 16          | N/A          | Dwell Sample No. 19   | N/A                        | N/A                                                                        | U         |
| 320       | 16          | N/A          | Dwell Sample No. 20   | N/A                        | N/A                                                                        | U         |
| 336       | 16          | N/A          | Dwell Sample No. 21   | N/A                        | N/A                                                                        | U         |
| 352       | 16          | N/A          | Dwell Sample No. 22   | N/A                        | N/A                                                                        | U         |
| 368       | 16          | N/A          | Dwell Sample No. 23   | N/A                        | N/A                                                                        | U         |
| 384       | 16          | N/A          | Dwell Sample No. 24   | N/A                        | N/A                                                                        | U         |
| 400       | 16          | N/A          | Dwell Sample No. 25   | N/A                        | N/A                                                                        | U         |
| 416       | 16          | N/A          | Dwell Sample No. 26   | N/A                        | N/A                                                                        | U         |
| 432       | 16          | N/A          | Dwell Sample No. 27   | N/A                        | N/A                                                                        | U         |
| 448       | 16          | N/A          | Dwell Sample No. 28   | N/A                        | N/A                                                                        | U         |
| 464       | 16          | N/A          | Dwell Sample No. 29   | N/A                        | N/A                                                                        | U         |
| 480       | 16          | N/A          | Dwell Sample No. 30   | N/A                        | N/A                                                                        | U         |
| 496       | 16          | N/A          | Dwell Sample No. 31   | N/A                        | N/A                                                                        | U         |
| 512       | 16          | N/A          | Dwell Sample No. 32   | N/A                        | N/A                                                                        | U         |
| 528       | 16          | N/A          | Dwell Sample No. 33   | N/A                        | N/A                                                                        | U         |
| 544       | 16          | N/A          | Dwell Sample No. 34   | N/A                        | N/A                                                                        | U         |
| 560       | 16          | N/A          | Dwell Sample No. 35   | N/A                        | N/A                                                                        | U         |
|           |             |              |                       |                            |                                                                            |           |

Dwell Sample N

| Table 4.1.10 ATMS Dwell Packet User Data | Fields | (cont) |
|------------------------------------------|--------|--------|
|------------------------------------------|--------|--------|

| Start Bit | Bit<br>Size | Memonic Name | Description         | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|--------------|---------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 576       | 16          | N/A          | Dwell Sample No. 36 | N/A                        | N/A                                                                        | U         |
| 592       | 16          | N/A          | Dwell Sample No. 37 | N/A                        | N/A                                                                        | U         |
| 608       | 16          | N/A          | Dwell Sample No. 38 | N/A                        | N/A                                                                        | U         |
| 624       | 16          | N/A          | Dwell Sample No. 39 | N/A                        | N/A                                                                        | U         |
| 640       | 16          | N/A          | Dwell Sample No. 40 | N/A                        | N/A                                                                        | U         |
| 656       | 16          | N/A          | Dwell Sample No. 41 | N/A                        | N/A                                                                        | U         |
| 672       | 16          | N/A          | Dwell Sample No. 42 | N/A                        | N/A                                                                        | U         |
| 688       | 16          | N/A          | Dwell Sample No. 43 | N/A 🔌                      | N/A                                                                        | U         |
| 704       | 16          | N/A          | Dwell Sample No. 44 | N/A                        | N/A                                                                        | U         |
| 720       | 16          | N/A          | Dwell Sample No. 45 | N/A                        | N/A                                                                        | U         |
| 736       | 16          | N/A          | Dwell Sample No. 46 | N/A                        | N/A                                                                        | U         |
| 752       | 16          | N/A          | Dwell Sample No. 47 | N/A                        | N/A                                                                        | U         |
| 768       | 16          | N/A          | Dwell Sample No. 48 | N/A                        | N/A                                                                        | U         |
| 784       | 16          | N/A          | Dwell Sample No. 49 | N/A                        | N/A                                                                        | U         |
| 800       | 16          | N/A          | Dwell Sample No. 50 | N/A                        | N/A                                                                        | U         |
| 816       | 16          | N/A          | Dwell Sample No. 51 | N/A                        | N/A                                                                        | U         |
| 832       | 16          | N/A          | Dwell Sample No. 52 | N/A                        | N/A                                                                        | U         |
| 848       | 16          | N/A          | Dwell Sample No. 53 | N/A                        | N/A                                                                        | U         |
| 864       | 16          | N/A          | Dwell Sample No. 54 | N/A                        | N/A                                                                        | U         |
| 880       | 16          | N/A          | Dwell Sample No. 55 | N/A                        | N/A                                                                        | U         |
| 896       | 16          | N/A          | Dwell Sample No. 56 | N/A                        | N/A                                                                        | U         |
| 912       | 16          | N/A          | Dwell Sample No. 57 | N/A                        | N/A                                                                        | U         |
| 928       | 16          | N/A          | Dwell Sample No. 58 | N/A                        | N/A                                                                        | U         |
| 944       | 16          | N/A          | Dwell Sample No. 59 | N/A                        | N/A                                                                        | U         |
| 960       | 16          | N/A          | Dwell Sample No. 60 | N/A                        | N/A                                                                        | U         |
| 976       | 16          | N/A          | Dwell Sample No. 61 | N/A                        | N/A                                                                        | U         |
| 992       | 16          | N/A          | Dwell Sample No. 62 | N/A                        | N/A                                                                        | U         |
| 1008      | 16          | N/A          | Dwell Sample No. 63 | N/A                        | N/A                                                                        | U         |
| 1024      | 16          | N/A          | Dwell Sample No. 64 | N/A                        | N/A                                                                        | U         |
| 1040      | 16          | N/A          | Dwell Sample No. 65 | N/A                        | N/A                                                                        | U         |
| 1056      | 16          | N/A          | Dwell Sample No. 66 | N/A                        | N/A                                                                        | U         |
| 1072      | 16          | N/A          | Dwell Sample No. 67 | N/A                        | N/A                                                                        | U         |
| 1088      | 16          | N/A          | Dwell Sample No. 68 | N/A                        | N/A                                                                        | U         |
| 1104      | 16          | N/A          | Dwell Sample No. 69 | N/A                        | N/A                                                                        | U         |
| 1120      | 16          | N/A          | Dwell Sample No. 70 | N/A                        | N/A                                                                        | U         |
| 1136      | 16          | N/A          | Dwell Sample No. 71 | N/A                        | N/A                                                                        | U         |
| 1152      | 16          | N/A          | Dwell Sample No. 72 | N/A                        | N/A                                                                        | U         |

Dwel Sample No. 72

| Table 4.1.10 ATMS Dwell Packet User Data Fiel | elds (cont) |
|-----------------------------------------------|-------------|
|-----------------------------------------------|-------------|

| Start Bit | Bit<br>Size | Memonic Name | Description          | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|--------------|----------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 1168      | 16          | N/A          | Dwell Sample No. 73  | N/A                        | N/A                                                                        | U         |
| 1184      | 16          | N/A          | Dwell Sample No. 74  | N/A                        | N/A                                                                        | U         |
| 1200      | 16          | N/A          | Dwell Sample No. 75  | N/A                        | N/A                                                                        | U         |
| 1216      | 16          | N/A          | Dwell Sample No. 76  | N/A                        | N/A                                                                        | U         |
| 1232      | 16          | N/A          | Dwell Sample No. 77  | N/A                        | N/A                                                                        | U         |
| 1248      | 16          | N/A          | Dwell Sample No. 78  | N/A                        | N/A                                                                        | U         |
| 1264      | 16          | N/A          | Dwell Sample No. 79  | N/A                        | N/A                                                                        | U         |
| 1280      | 16          | N/A          | Dwell Sample No. 80  | N/A 🔌                      | N/A                                                                        | U         |
| 1296      | 16          | N/A          | Dwell Sample No. 81  | N/A                        | N/A                                                                        | U         |
| 1312      | 16          | N/A          | Dwell Sample No. 82  | N/A                        | N/A                                                                        | U         |
| 1328      | 16          | N/A          | Dwell Sample No. 83  | N/A                        | N/A                                                                        | U         |
| 1344      | 16          | N/A          | Dwell Sample No. 84  | N/A                        | N/A                                                                        | U         |
| 1360      | 16          | N/A          | Dwell Sample No. 85  | N/A                        | N/A                                                                        | U         |
| 1376      | 16          | N/A          | Dwell Sample No. 86  | N/A                        | N/A                                                                        | U         |
| 1392      | 16          | N/A          | Dwell Sample No. 87  | N/A                        | N/A                                                                        | U         |
| 1408      | 16          | N/A          | Dwell Sample No. 88  | N/A                        | N/A                                                                        | U         |
| 1424      | 16          | N/A          | Dwell Sample No. 89  | N/A                        | N/A                                                                        | U         |
| 1440      | 16          | N/A          | Dwell Sample No. 90  | N/A                        | N/A                                                                        | U         |
| 1456      | 16          | N/A          | Dwell Sample No. 91  | N/A                        | N/A                                                                        | U         |
| 1472      | 16          | N/A          | Dwell Sample No. 92  | N/A                        | N/A                                                                        | U         |
| 1488      | 16          | N/A          | Dwell Sample No. 93  | N/A                        | N/A                                                                        | U         |
| 1504      | 16          | N/A          | Dwell Sample No. 94  | N/A                        | N/A                                                                        | U         |
| 1520      | 16          | N/A          | Dwell Sample No. 95  | N/A                        | N/A                                                                        | U         |
| 1536      | 16          | N/A          | Dwell Sample No. 96  | N/A                        | N/A                                                                        | U         |
| 1552      | 16          | N/A          | Dwell Sample No. 97  | N/A                        | N/A                                                                        | U         |
| 1568      | 16          | N/A          | Dwell Sample No. 98  | N/A                        | N/A                                                                        | U         |
| 1584      | 16          | N/A          | Dwell Sample No. 99  | N/A                        | N/A                                                                        | U         |
| 1600      | 16          | N/A          | Dwell Sample No. 100 | N/A                        | N/A                                                                        | U         |
| 1616      | 16          | N/A          | Dwell Sample No. 101 | N/A                        | N/A                                                                        | U         |
| 1632      | 16          | N/A          | Dwell Sample No. 102 | N/A                        | N/A                                                                        | U         |
| 1648      | 16          | N/A          | Dwell Sample No. 103 | N/A                        | N/A                                                                        | U         |
| 1664      | 16          | N/A          | Dwell Sample No. 104 | N/A                        | N/A                                                                        | U         |
| 1680      | 16          | N/A          | Dwell Sample No. 105 | N/A                        | N/A                                                                        | U         |
| 1696      | 16          | N/A          | Dwell Sample No. 106 | N/A                        | N/A                                                                        | U         |
| 1712      | 16          | N/A          | Dwell Sample No. 107 | N/A                        | N/A                                                                        | U         |
| 1728      | 16          | N/A          | Dwell Sample No. 108 | N/A                        | N/A                                                                        | U         |
| 1744      | 16          | N/A          | Dwell Sample No. 109 | N/A                        | N/A                                                                        | U         |

Dweil Sample No. 109

| Table 4.1.10 ATMS Dwell Packet User Data | Fields | (cont) |
|------------------------------------------|--------|--------|
|------------------------------------------|--------|--------|

| Start Bit | Bit<br>Size | Memonic Name | Description          | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|--------------|----------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 1760      | 16          | N/A          | Dwell Sample No. 110 | N/A                        | N/A                                                                        | U         |
| 1776      | 16          | N/A          | Dwell Sample No. 111 | N/A                        | N/A                                                                        | U         |
| 1792      | 16          | N/A          | Dwell Sample No. 112 | N/A                        | N/A                                                                        | U         |
| 1808      | 16          | N/A          | Dwell Sample No. 113 | N/A                        | N/A                                                                        | U         |
| 1824      | 16          | N/A          | Dwell Sample No. 114 | N/A                        | N/A                                                                        | U         |
| 1840      | 16          | N/A          | Dwell Sample No. 115 | N/A                        | N/A                                                                        | U         |
| 1856      | 16          | N/A          | Dwell Sample No. 116 | N/A                        | N/A                                                                        | U         |
| 1872      | 16          | N/A          | Dwell Sample No. 117 | N/A 🔌                      | N/A                                                                        | U         |
| 1888      | 16          | N/A          | Dwell Sample No. 118 | N/A                        | N/A                                                                        | U         |
| 1904      | 16          | N/A          | Dwell Sample No. 119 | N/A                        | N/A                                                                        | U         |
| 1920      | 16          | N/A          | Dwell Sample No. 120 | N/A                        | N/A                                                                        | U         |
| 1936      | 16          | N/A          | Dwell Sample No. 121 | N/A                        | N/A                                                                        | U         |
| 1952      | 16          | N/A          | Dwell Sample No. 122 | N/A                        | N/A                                                                        | U         |
| 1968      | 16          | N/A          | Dwell Sample No. 123 | N/A                        | N/A                                                                        | U         |
| 1984      | 16          | N/A          | Dwell Sample No. 124 | N/A                        | N/A                                                                        | U         |
| 2000      | 16          | N/A          | Dwell Sample No. 125 | N/A                        | N/A                                                                        | U         |
| 2016      | 16          | N/A          | Dwell Sample No. 126 | N/A                        | N/A                                                                        | U         |
| 2032      | 16          | N/A          | Dwell Sample No. 127 | N/A                        | N/A                                                                        | U         |
| 2048      | 16          | N/A          | Dwell Sample No. 128 | N/A                        | N/A                                                                        | U         |
| 2064      | 16          | N/A          | Dwell Sample No. 129 | N/A                        | N/A                                                                        | U         |
| 2080      | 16          | N/A          | Dwell Sample No. 130 | N/A                        | N/A                                                                        | U         |
| 2096      | 16          | N/A          | Dwell Sample No. 131 | N/A                        | N/A                                                                        | U         |
| 2112      | 16          | N/A          | Dwell Sample No. 132 | N/A                        | N/A                                                                        | U         |
| 2128      | 16          | N/A          | Dwell Sample No. 133 | N/A                        | N/A                                                                        | U         |
| 2144      | 16          | N/A          | Dwell Sample No. 134 | N/A                        | N/A                                                                        | U         |
| 2160      | 16          | N/A          | Dwell Sample No. 135 | N/A                        | N/A                                                                        | U         |
| 2176      | 16          | N/A          | Dwell Sample No. 136 | N/A                        | N/A                                                                        | U         |
| 2192      | 16          | N/A          | Dwell Sample No. 137 | N/A                        | N/A                                                                        | U         |
| 2208      | 16          | N/A          | Dwell Sample No. 138 | N/A                        | N/A                                                                        | U         |
| 2224      | 16          | N/A          | Dwell Sample No. 139 | N/A                        | N/A                                                                        | U         |
| 2240      | 16          | N/A          | Dwell Sample No. 140 | N/A                        | N/A                                                                        | U         |
| 2256      | 16          | N/A          | Dwell Sample No. 141 | N/A                        | N/A                                                                        | U         |
| 2272      | 16          | N/A          | Dwell Sample No. 142 | N/A                        | N/A                                                                        | U         |
| 2288      | 16          | N/A          | Dwell Sample No. 143 | N/A                        | N/A                                                                        | U         |
| 2304      | 16          | N/A          | Dwell Sample No. 144 | N/A                        | N/A                                                                        | U         |
| 2320      | 16          | N/A          | Dwell Sample No. 145 | N/A                        | N/A                                                                        | U         |
| 2336      | 16          | N/A          | Dwell Sample No. 146 | N/A                        | N/A                                                                        | U         |
| 2352      | 16          | N/A          | Dwell Sample No. 147 | N/A                        | N/A                                                                        | Ū         |
| 2368      | 16          | N/A          | Dwell Sample No. 148 | N/A                        | N/A                                                                        | Ū         |
|           |             |              |                      |                            |                                                                            |           |

Dweil Sample No

#### Memory Dump

Memory Dump packets (APID 524) are generated in response to a memory dump command. To confirm a memory load, the operator can compare the Memory Dump contents to what was loaded or calculate a 16-bit checksum of the load, send a Memory Checksum Command to have ATMS return its checksum of the received load and then compare the ground calculated checksum with the one ATMS calculated. The checksum is defined as the 16-bit sum of the 16-bit words over the memory range with the overflow discarded. The memory dump command can request memory from program RAM, data RAM, an I/O address, or the SDE. The ATMS Memory Interface technical memo, TM-04-161A, discussed these sections of the ATMS memory in greater detail. The first memory dump packet user data field contains the type of memory, the memory start address, number of words to follow in the memory data field, and the actual memory data (contents of the memory data field). The packet is variable in length (up to 1024 octets) with an integral even number of octets. The time tag field in the memory dump packet indicates the time the dump packet was created. Multiple dump packets are needed in order to retrieve the sections of memory larger than 1002 octets. For dumps larger than 1002 octets, all packets will be flagged as standalone and have secondary header timestamps with the time of packet creation. The maximum rate of memory dump packets is limited to 30 kbps, the maximum ATMS rate for mission data. Memory dump packets are sent at a rate that will not exceed the 30 kbps rate when combined with other ATMS mission data. The packet structure of APID 524 is illustrated in Figure 4.1-11 to Figure 4.1-14 and the user data fields are listed in Table 4.1.11.



INITIAL PACKET





FOLLOW-ON PACKET

Fixed Packet Length: 1024 Octets

|        | PACKET PRIMARY HEADER |                       |                 |                   |                                                |                   |                   | SECONDARY        | User Data Field    |        |
|--------|-----------------------|-----------------------|-----------------|-------------------|------------------------------------------------|-------------------|-------------------|------------------|--------------------|--------|
|        | Verson<br>No.         | Packet Identification |                 |                   | Packet Sequence Packet<br>Control (PSC) Length |                   |                   | HEADER           | ATMS Memory Dump   |        |
|        |                       | Type<br>Indicator     | Sec Hdr<br>Flag | APID              | Sequence<br>Flags                              | Sequence<br>Count |                   | Start of<br>Scan | Memory Data Field  | TOTA I |
| Bits   | 3                     | 1                     | 1               | 11                | 2                                              | 14                | 16                | 64               | 8080               | 8192   |
| Octets |                       |                       | 2               |                   |                                                | 2                 | 2                 | 8                | 1010               | 1024   |
| Value  | 000                   | 0,                    | 1               | 20C <sub>16</sub> | 11                                             | varies            | 3F9 <sub>16</sub> | varies           | varies             |        |
| Ŀ      | 'acket                |                       | Present         | Figure            | 4.1-13                                         | ATMS M            | emory I           | Dump Follow      | r-on Packet Format |        |
|        |                       |                       |                 |                   |                                                |                   |                   |                  |                    |        |

FINAL PACKET



Figure 4.1-14 ATMS Memory Dump Final Packet Format

ry Dump Internet to the second second
## Table 4.1.11 ATMS Memory Dump Packet User Data Fields

| Start B            | t Bit<br>Size             | Memonic Name               | Description                                                                                               | Units<br>OR<br>State Value                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type             |
|--------------------|---------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------|-----------------------|
| 0<br>2<br>32<br>64 | 2<br>30<br>32<br>variable | N/A<br>N/A<br>N/A<br>N/A   | Memory Dump Type<br>Start Address of Memory Dump<br>Number of 16-bit Words to Follow<br>Memory Data Field | 0 1<br>1 [<br>2 [<br>3 2<br>N/A<br>N/A<br>N/A | ro<br>Data<br>(O<br>SDE N/A<br>N/A<br>N/A                                  | B<br>U<br>U<br>U<br>U |
|                    |                           |                            |                                                                                                           |                                               |                                                                            |                       |
|                    |                           |                            |                                                                                                           |                                               |                                                                            |                       |
|                    |                           |                            | HOLIO BUILSIC                                                                                             |                                               |                                                                            |                       |
|                    |                           | ~                          | BHI CI.                                                                                                   |                                               |                                                                            |                       |
| Chec               | k the N                   | PP CCR website at <u>t</u> | <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version                         | n prior to use.                               |                                                                            |                       |

#### Test Packet

When commanded, ATMS will output one Test packet every time it is polled (12 Hz) until disabled by command. The Test packet consists of a packet header with APID 514 and a fixed data pattern of 250 'CC' hex characters for a total of 256 bytes. Figure 4.1-15 shows the format of the ATMS Test Packet.

|        |        |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field |       |
|--------|--------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-----------------|-------|
|        | Verson | Packe             | t Identifi      | cation    | Packet S          | Sequence          | Packet | Test Pattern    |       |
|        | No.    | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | Т               | ΓΟΤΑL |
| Bits   | 3      | 1                 | 1               | 11        | 2                 | 14                | 16     | 2000 2          | 2048  |
| Octets |        |                   | 2               |           |                   | 2                 | 2      | 250 2           | 256   |
| Value  | 000    | , 0               | 0 \             | 0x202     | 11                | varies            | 0x00F9 | repeating 0xCC  |       |
|        |        |                   |                 |           |                   |                   |        |                 |       |

|                  | Secondary Header |
|------------------|------------------|
| Telemetry Packet | Not Present      |

### Figure 4.1-15 ATMS Test Packet Format

## 4.2 CRIS

#### 4.2.1 Introduction

The Crosstrack Infrared Sounder (CrIS), shown in Figure 4.2-1, is a dynamically aligned Michelson interferometer covering 3 bands over a spectral range of  $3.92 \,\mu\text{m}$  to  $15.38 \,\mu\text{m}$  (650 cm<sup>-1</sup> to 2550 cm<sup>-1</sup>). The 8-second cross-track scan is controlled by a step-and settle-positioning system with 30 earth scene positions centered about nadir. Double-sided interferograms are collected from 9 fields of view (FOV) in a 3x3 array configuration at each position or field of regard (FOR) as shown in Figure 4.2-2.



Figure 4.2-1 CrIS Drawing of the Instrument

The CrIS's mission is to collect upwelling infrared spectra at very high spectral resolution, and with excellent radiometric precision. This data is then merged with microwave data collected by the Advanced Technology Microwave Sounder (ATMS) to construct highly accurate temperature, moisture, and pressure profiles of the earth's atmosphere. Collectively, the CrIS and the ATMS sensors are referred to as the Crosstrack Infrared and Microwave Sounding Suite (CrIMSS).

The CrIS sensor system produces three key EDRs:

- Atmospheric Vertical Moisture Profiles
- Atmospheric Vertical Temperature Profiles
- Atmospheric Vertical Pressure Profiles

# 4.2.2 Instrument Function

Figure 4.2-3 shows an optical path of radiation through the CrIS modules. Figure 4.2-4 shows an exploded view of the CrIS modules. The optical bench module provides the structural anchor for telescope, interferometer (IM), aft optics, detector cooler, and detector preamplifier modules (listed as the super module in Figure 4.2-4). The Scene Selection Module (SSM) contains the scan mirror, mirror baffle, bearings, cross-track and in-track scan motors and position sensors, scan electronics, earth radiators, and space radiators. The Internal Calibration Target (ICT), equipped with precision temperature sensors, emits a radiance standard for the calibration of the CrIS data Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

measured by the CrIS once every scan over the entire range of spectral bands. The Processing and Control Electronics (PCE) Module controls all sensor operations by processing Interferometer and SSM Commands and data, processing mission data (interferograms), collecting sensor health and status telemetry, controlling sensor temperatures, managing sensor power, and processing spacecraft commands and transmitting data.



Figure 4.2-2 CrIS Field of Regard About Nadir and 9 Field of Views (FOVs are depicted on the Earth; the anti-sun direction is to the left; the velocity direction is downward.)

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.







Figure 4.2-4 CrIS Modules (Exploded View)

The SSM directs Earth scene and calibration radiance into CrIS optical modules. Figure 4.2-5 shows the scene viewed by CrIS, which consists of 30 steps of 3.33 degrees each

with 0.167-second dwell time reaching full  $\pm$ 48.3-degree scene coverage. The 3 x 3 array of 14 km diameter CrIS FOV undergoes a rotation during the cross-track scan and grows to maximum of 49 x 31 km ellipses as the scan progresses away from nadir. The SSM views the scene, space and internal calibration target every 8 seconds. The scan system also includes in-track velocity compensation.



Figure 4.2-5 CrIS Scene View: 30 Steps per 8 Second Scan

After the SSM, the Telescope Module delivers incoming radiation to the Aft Optics Module which divides the input into SWIR, MWIR, and LWIR bands with LWIR Dichroic and MWIR Dichroic beamsplitters. The Interferometer Module (IM) consists of the Beamsplitter-Compensator Assembly, the porchswing assembly moving the mirror to induce an optical path difference (OPD), the Dynamic Alignment (DA) assembly compensating for the minimal tilt between the two arms of the interferometer, the metrology laser and neon sources and detection assembly for wavelength calibration and metrology determining the OPD between the moving and fixed mirrors and the direction of the mirror movement, electronics providing command, control, and housekeeping for the interferometer, sampling the IR detectors, controlling the porchswing, DA and metrology systems, and the structure to maintain alignment between the components in the thermal and vibration environment and to interface to the sensor. The LW, MW, and SW spectral range, resolution and maximum path difference (MPD) are given in Table 4.2.1.

| Band | Spectral<br>Range<br>[cm <sup>.</sup> ] | Spectral<br>Range<br>[µm <sup>1</sup> ] | Band Width<br>[cm <sup>.</sup> ] | Resolution<br>[cm <sup>-</sup> ] | MPD<br>[cm <sup>-1</sup> ] |
|------|-----------------------------------------|-----------------------------------------|----------------------------------|----------------------------------|----------------------------|
| LW   | 650-1095                                | 15.4-9.1                                | 445                              | 0.625                            | 0.8                        |
| MW   | 1210-1750                               | 8.3-5.7                                 | 540                              | 1.25                             | 0.4                        |
| SW   | 2155-2550                               | 4.6-3.9                                 | 395                              | 2.5                              | 0.2                        |

 Table 4.2.1 CrlS Spectral Band Coverage and Resolution

The Controller circuit card assembly (CCA) forms part of the IM Electronics. It contains servo controllers for the interferometer mechanisms: porchswing (PS), dynamic alignment x (DAx), and dynamic alignment y (DAy) and a temperature controller used to control the temperature of the interferometer's laser diode. The Controller CCA provides the PCE clock, timing, and serial command and telemetry interface. The timing function synchronizes PS travel with the PCE provided 400mS sync, generates and outputs a timing signal to the PCE that indicates proper synchronization for sampling IR data, and responds to the PCE provided reset signal for proper start up initialization. The serial command and telemetry function receives, parses, and distributes PCE generated commands and gathers telemetry data. Finally, the Controller CCA provides interferometer system control such as the DA search mode routines, proper transitioning between DA coarse acquisitioning and DA servo control, and health and safety monitoring and control.

The CrIS PCE houses the Instrument Flight Computer (IFC), Housekeeping CCA, Signal Processing CCA's, FireWire Command & Data Bus interface, and the Power Supply Assembly. The IFC exchanges command and data with the spacecraft over the 1394a serial interface bus and interfaces internally with the SSM and IM. In addition, the IFC controls the CrIS functions by communicating with the Housekeeping and Signal Processing CCAs and manages sensor power by switching power supplies and by providing all power supply converters with a common sync frequency. The Signal Processing CCA is comprised of three major subsystems – the Preamp Electronics, the IR Signal Processing electronics and the FIR Filter electronics – to amplify, bandpass limit, digitize, and process interferograms of scene radiance recorded by the CrIS. It also performs analog anti-alias filtering, interferogram digitization, impulse/noise detection/correction, digital FIR filtering, decimation, ZPD location estimation, generation of data guality flags, commandable analog IR gain control and the provision of key telemetry and commandable sampling electronics delay matching. There are three Signal Processing CCAs, one for each FPA of the three wavelength bands, i.e. SWIR, MWIR, and LWIR. Each FPA has 9 detectors producing 9 interferograms for each FOR. The interferogram processing is shown in Figure 4.2-6.



### Figure 4.2-6 CrIS Functional Flow of Space Processing

The Structure Module consists of the primary sensor structure, the interface for mounting to the isolation module, the module interfaces, and the thermal control surfaces, heaters

MARCICI

and electronics. The Deployable Cooler Cover, a retractable metalized film cover, provides contamination protection for the Passive Radiant Cooler Module. The cooler cover mounts directly to the CrIS sensor Structural Module. A pair of redundant limit switches is integrated into the cover mechanism to give positive indication of proper cover retraction and stowage. The door is controlled by the PCE.

#### 4.2.3 Modes and Packet Structure

The CrIS functional modes are:

- OFF
- Survival
- Safe
- Diagnostic
- Operational
- Outgas

The Processing and Control Electronics (PCE) Flight Software modes and their transitions are shown in Figure 4.2-7. Software controls the instrument mode transitions. Aside from the "Sensor Safe" command, there is no single command that changes the CrIS Instrument from one mode to another.



Figure 4.2-7 CrIS Modes and Mode Transitions

Within these modes the functions of activation and checkout for the CrIS sensor are supported. Activation refers to CrIS turn-on, and subsequent component warm up, or cool down, to operating temperatures. Activation terminates when all instrument temperatures, biases, and currents have stabilized within specified operational limits. For CrIS, this refers to a period of time, rather than a different state of the instrument. Activation also includes the opening of the cooler door cover.

Table 4.2.2 lists all the X-band unique packets output by the CrIS.

### Table 4.2.2 CrIS Mission Data Packet Types

| VC | APID <sub>10</sub> | Telemetry Packet                                        | Data Rate (bp  | os) by Mode         | by Mode Downlink      |                       |                            |  |  |
|----|--------------------|---------------------------------------------------------|----------------|---------------------|-----------------------|-----------------------|----------------------------|--|--|
| U  |                    | Name                                                    | Operational    | Diagnostic          | HRD                   | SMD                   | (octets)                   |  |  |
| 0  | 1280               | Instrument HK<br>Telemetry Sub-Packet<br>#1, Note 1     | Note 1         | Note 1              | $\checkmark$          | $\checkmark$          | Note 1                     |  |  |
| 0  | 1281               | Instrument HK<br>Telemetry Sub-Packet<br>#2, Note 1     | Note 1         | Note 1              | ~                     | ~                     | Note 1                     |  |  |
| 0  | 1282               | Instrument HK<br>Telemetry Sub-Packet<br>#3, Note 1     | Note 1         | Note 1              | ~                     | ~                     | Note 1                     |  |  |
| 0  | 1283               | Instrument HK<br>Telemetry Sub-Packet<br>#4, Note 1     | Note 1         | Note 1              |                       |                       | Note 1                     |  |  |
| 0  | 1284               | Instrument HK<br>Telemetry Sub-Packet<br>#5, Note 1     | Note 1         | Note 1              |                       | <ul> <li>✓</li> </ul> | Note 1                     |  |  |
| 0  | 1285               | Instrument HK<br>Telemetry Sub-Packet<br>#6, Note 1     | Note 1         | Note 1              | ~ ~                   | ~                     | Note 1                     |  |  |
| 0  | 1286               | Instrument HK<br>Telemetry Sub-Packet<br>#7, Note 1     | Note 1         | Note 1              | $\checkmark$          | $\checkmark$          | Note 1                     |  |  |
| 0  | 1287               | Instrument HK<br>Telemetry Sub-Packet<br>#8, Note 1     | Note 1         | Note 1              | $\checkmark$          | $\checkmark$          | Note 1                     |  |  |
| 0  | 1288               | LEO&A, Note 1                                           | Note 1         | Note 1              | $\checkmark$          | $\checkmark$          | Note 1                     |  |  |
| 6  | 1289               | Eight Second<br>Science/Calibration<br>Telemetry Packet | 560            | 560                 | $\checkmark$          | $\checkmark$          | 560                        |  |  |
| 6  | 1290               | Four Minute<br>Engineering Telemetry<br>Packet          | 257.7          | 257.7               | $\checkmark$          | $\checkmark$          | 7730                       |  |  |
| 21 | 1291               | HK Telemetry Dwell<br>Packet                            |                | 39520               |                       | $\checkmark$          | 988                        |  |  |
| 21 | 1292               | SSM Telemetry Dwell<br>Packet                           |                | 46000               |                       | $\checkmark$          | 1150                       |  |  |
| 21 | 1293               | IM Telemetry Dwell<br>Packet                            |                | 46000               |                       | $\checkmark$          | 1150                       |  |  |
| 8  | 1294               | LW Diagnostic<br>Interferogram Packet                   |                | 1684240<br>(Note 2) |                       | $\checkmark$          | 42106*                     |  |  |
| 8  | 1295               | MW Diagnostic<br>Interferogram Packet                   |                | 869520<br>(Note 2)  |                       | $\checkmark$          | 21738*                     |  |  |
| 8  | 1296               | SW Diagnostic<br>Interferogram Packet                   |                | 441680<br>(Note 2)  |                       | $\checkmark$          | 11042*                     |  |  |
| 6  | 1315               | LW 1 Earth Scene                                        | 74820          |                     | $\checkmark$          | $\checkmark$          | 2494**                     |  |  |
| 6  | 1316               | LW 2 Earth Scene                                        | 74820          |                     | $\checkmark$          | $\checkmark$          | 2494**                     |  |  |
| 6  | 1317               | LW 3 Earth Scene                                        | 74820          |                     | $\checkmark$          | $\checkmark$          | 2494**                     |  |  |
| 6  | 1318               | LW 4 Earth Scene                                        | 74820          |                     | $\checkmark$          | $\checkmark$          | 2494**                     |  |  |
| 6  | 1319               | LW 5 Earth Scene                                        | 74820          |                     | <ul> <li>✓</li> </ul> | ✓                     | 2494**                     |  |  |
| 6  | 1320               | LW 6 Earth Scene                                        | 74820          |                     | <b>√</b>              | <b>√</b>              | 2494**                     |  |  |
| 0  | 1321               | LW / Earth Scene                                        | 74820<br>74820 |                     | ✓<br>✓                | ✓<br>✓                | 2494 <sup></sup><br>2404** |  |  |
| 0  | 1322               |                                                         | 14020          |                     | i i                   | I .                   | 2434                       |  |  |

| 6 | 1323 | LW 9 Earth Scene   | 74820 | <br>$\checkmark$ | $\checkmark$ | 2494**   |
|---|------|--------------------|-------|------------------|--------------|----------|
| 6 | 1324 | MW 1 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1325 | MW 2 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1326 | MW 3 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1327 | MW 4 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1328 | MW 5 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1329 | MW 6 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1330 | MW 7 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1331 | MW 8 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1332 | MW 9 Earth Scene   | 50700 | <br>$\checkmark$ | $\checkmark$ | 1690**   |
| 6 | 1333 | SW 1 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1334 | SW 2 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1335 | SW 3 Earth Scene   | 15060 | <br>$\checkmark$ |              | 502**    |
| 6 | 1336 | SW 4 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1337 | SW 5 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1338 | SW 6 Earth Scene   | 15060 | <br>$\sim$       | $\checkmark$ | 502**    |
| 6 | 1339 | SW 7 Earth Scene   | 15060 | <br>$\sim$       | $\checkmark$ | 502**    |
| 6 | 1340 | SW 8 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1340 | SW 9 Earth Scene   | 15060 | <br>$\checkmark$ | $\checkmark$ | 502**    |
| 6 | 1342 |                    | /088  | $\checkmark$     | $\checkmark$ | 2/0/**   |
| 6 | 1343 | LW 2 Deep Space    | 4900  | ·                | ·            | 2434     |
| 6 | 1343 | LW 3 Deep Space    | 4088  | ·                | ·            | 2434     |
| 6 | 1344 | LW 4 Deep Space    | 4900  |                  | ·<br>✓       | 2494     |
| 6 | 1345 |                    | 4900  | <br>·<br>·       | ,<br>,       | 2494     |
| 6 | 1340 | LW 6 Deep Space    | 4900  | <br>·<br>·       | ,<br>,       | 2494     |
| 6 | 1347 |                    | 4900  | <br>•            | •            | 2494     |
| 6 | 1340 |                    | 4900  | <br>•            | •            | 2494     |
| 6 | 1349 |                    | 4900  | <br>•            | •            | 2494     |
| 0 | 1350 | Livi 9 Deep Space  | 4900  | <br>•            | •            | 2494     |
| 0 | 1351 |                    | 3300  | <br>•            | •            | 1690     |
| 0 | 1352 | MW 2 Deep Space    | 3300  | <br>•            | •            | 1090     |
| 0 | 1353 | MW 3 Deep Space    | 3360  | <br>•            | •            | 1090     |
| 0 | 1334 | MW 4 Deep Space    | 3360  | <br>•            | •            | 1090     |
| 0 | 1355 | MW 5 Deep Space    | 3380  | <br>•            | v            | 1690**   |
| 6 | 1356 | MW 6 Deep Space    | 3380  | <br>v<br>        | v            | 1690**   |
| 6 | 1357 | MW 7 Deep Space    | 3380  | <br>v<br>        | v            | 1690**   |
| 6 | 1358 | MW 8 Deep Space    | 3380  | <br>V            | v            | 1690**   |
| 6 | 1359 | MW 9 Deep Space    | 3380  | <br>V            | v            | 1690**   |
| 6 | 1360 | SW 1 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1361 | SW 2 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1362 | SW 3 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1363 | SW 4 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1364 | SW 5 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1365 | SW 6 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1366 | SW 7 Deep Space    | 1004  | <br>✓            | ✓            | 502**    |
| 6 | 1367 | SW 8 Deep Space    | 1004  | <br>✓            | √<br>∕       | 502**    |
| 6 | 1368 | SW 9 Deep Space    | 1004  | <br><b>√</b>     | <b>√</b>     | 502**    |
| 6 | 1369 | LW 1 Internal      | 4988  | <br>$\checkmark$ | ✓            | 2494**   |
|   |      | Calibration Target |       |                  |              |          |
| 6 | 1370 | LW 2 Internal      | 4988  | <br>$\checkmark$ | ✓            | 2494**   |
|   | 4.5  | Calibration Target |       |                  |              |          |
| 6 | 1371 | LW 3 Internal      | 4988  | <br>$\checkmark$ | ~            | 2494**   |
|   | 4070 | Calibration Larget | 4000  |                  |              | 0.40.4** |
| 6 | 1372 | LVV 4 Internal     | 4988  | <br>V            | ~            | 2494**   |
|   |      | Calibration Larget | 1     |                  |              |          |

| 6  | 1373 | I W 5 Internal     | 1088  |          | $\checkmark$ | $\checkmark$          | 2/0/**        |
|----|------|--------------------|-------|----------|--------------|-----------------------|---------------|
| 0  | 1373 | Calibration Target | 4900  |          |              | •                     | 2434          |
| 6  | 1374 | I W 6 Internal     | 4988  |          | $\checkmark$ | $\checkmark$          | 2494**        |
| Ŭ  | 1074 | Calibration Target | 4000  |          |              |                       | 2404          |
| 6  | 1375 | I W 7 Internal     | 4988  |          | $\checkmark$ | $\checkmark$          | 2494**        |
| Ŭ  | 1010 | Calibration Target | 1000  |          |              |                       | 2101          |
| 6  | 1376 | LW 8 Internal      | 4988  |          | $\checkmark$ | $\checkmark$          | 2494**        |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1377 | LW 9 Internal      | 4988  |          | $\checkmark$ | $\checkmark$          | 2494**        |
|    |      | Calibration Target |       |          |              |                       | A             |
| 6  | 1378 | MW 1 Internal      | 3380  |          | $\checkmark$ | <ul> <li>✓</li> </ul> | 1690**        |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1379 | MW 2 Internal      | 3380  |          | $\checkmark$ |                       | 1690**        |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1380 | MW 3 Internal      | 3380  |          |              | $\checkmark$          | 1690**        |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1381 | MW 4 Internal      | 3380  |          |              | $\checkmark$          | 1690**        |
|    | 1000 | Calibration Target |       |          |              |                       | 4000**        |
| 6  | 1382 | MW 5 Internal      | 3380  |          | ~            | ~                     | 1690^^        |
| 6  | 1000 |                    | 2200  |          |              |                       | 1000**        |
| 0  | 1383 | NIV 6 Internal     | 3380  |          | v            | v                     | 1690          |
| 6  | 1204 |                    | 2200  |          | ✓            | <u> </u>              | 1600**        |
| 0  | 1304 | Calibration Target | 3300  |          | · ·          | •                     | 1690          |
| 6  | 1385 | MW 8 Internal      | 3380  |          | $\checkmark$ | $\checkmark$          | 1600**        |
| 0  | 1000 | Calibration Target | 5500  |          |              |                       | 1030          |
| 6  | 1386 | MW 9 Internal      | 3380  |          | $\checkmark$ | $\checkmark$          | 1690**        |
| Ŭ  | 1000 | Calibration Target | 0000  |          |              |                       | 1000          |
| 6  | 1387 | SW 1 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
| Ŭ  | 1001 | Calibration Target |       |          |              |                       | 002           |
| 6  | 1388 | SW 2 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
| _  |      | Calibration Target |       |          |              |                       |               |
| 6  | 1389 | SW 3 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1390 | SW 4 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1391 | SW 5 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1392 | SW 6 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
|    |      | Calibration Target |       |          | ,            |                       |               |
| 6  | 1393 | SW 7 Internal      | 1004  |          | $\checkmark$ | $\checkmark$          | 502**         |
|    |      | Calibration Target |       |          |              |                       |               |
| 6  | 1394 | SW 8 Internal      | 1004  |          | ✓            | ✓                     | 502**         |
|    | 1005 | Calibration Larget | 400.4 |          |              |                       | <b>500</b> tt |
| 6  | 1395 | SW 9 Internal      | 1004  |          | Ý            | ×                     | 502**         |
|    |      | Calibration Larget |       |          |              |                       |               |
| 24 | 1207 | Momon / Duma       |       | voriable |              |                       | l la ta       |
| 21 | 1397 | wemory Dump        |       | variable |              | l í                   | Up to         |
| Q  | 1309 | Test Dacket Note 1 |       | 256      |              | $\checkmark$          | 32192<br>256  |
| 0  | 1280 |                    |       | 200      |              |                       | 200           |

Documented in the NPP Command and Telemetry Handbook
 Data Rate for APIDs 1294-1296 assumes 40 packets per scan are output. It is possible for 34 packets per scan to be output. See Diagnostic Data section.
 \* The maximum size of the diagnostic packets is 42618 octets.

\*\* The maximum size of these packets is 4734 octets.

### 4.2.3.1 Off Mode

In the OFF mode, the CrIS receives no external power for operation, including survival heater power. CrIS OFF mode is used for ground storage and transportation, launch, and spacecraft power crisis situations.

#### 4.2.3.2 Survival Mode

Instrument operational power will be off but spacecraft will supply power to instrument survival or warm up heaters. In survival mode, the spacecraft is responsible for sampling critical instrument temperatures via the instrument passive analog temperature sensors. Normal instrument telemetry is not available with operational power off.

#### 4.2.3.3 Safe Mode

The safe mode is an intermediate state between OFF/Survival mode and the other modes. In the safe mode the CrIS sensor is partially powered up and operating. Housekeeping telemetry, science/calibration telemetry and engineering packets are produced and transmitted in the safe mode, however no science data are produced.

#### 4.2.3.4 Diagnostic Mode

Diagnostic mode capability is initiated by the ground or Spacecraft to operate the CrIS in manner outside of the other standard modes. In the diagnostic mode, the CrIS is capable of operation and supports the following:

- 1. Normal transition between the safe mode and the operational mode.
- 2. Early on-orbit checkout to verify the operability of the CrIS sensor. This is done via an ability to transmit raw undecimated interferograms, and to dwell on selected telemetry points so as to transmit data from these points at a high rate.
- 3. Support troubleshooting and/or instrument characterization.
- 4. Software uploads.

To support early orbit checkout and anomaly resolution, CrIS can selectively disable any on-orbit processing operation that modifies (i.e. combines or compresses) raw data in any manner.

In the diagnostic mode, CrIS transmits undecimated interferograms instead of science packets. Also, CrIS may provide up to six channels of high data rate telemetry at a combined rate of 3200 samples per second from the Housekeeping CCA. When in diagnostic mode, up to six channels of the high rate telemetry defined in Section 4.2.4.5 can be transmitted.

CrIS accommodates the specified diagnostic mode by receipt of a command or series of commands that set up the desired diagnostic data output. Dwells are externally commanded for instrument anomaly resolution. The instrument has the capability to dwell (multiple samples per second) on particular telemetry measurands, as required to support ground diagnostic investigations. Telemetry dwell is a ground-initiated process.

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

#### 4.2.3.4.1 Initialization Stabilization Submode

The CrIS Initialization sub-mode is a part of the Activation procedure. In this sub-mode, additional sequences of Built-In Tests are run, checking the functionality of the Scene Selection Module, Interferometer, and Detectors. When Diagnostic BIT is running. mission data transmission is not required, however the capability of transmitting an undecimated interferogram is provided. The BIT result is reported via telemetry to the spacecraft upon completion of the BIT.

#### 4.2.3.5 Operational Mode

When in the operational mode, the CrIS sensor is collecting mission and calibration data in its normal operating mode (i.e., continuous 8-second cross-track scans), and is capable of meeting all sensor performance requirements. The instrument transmits science, health, and status data to the spacecraft. The CrIS is fully functional, providing all data originating within the instrument, necessary to produce application packets.

#### 4.2.3.6 Outgas Mode

The outgas mode provides the function of purging contaminants from the CrIS sensor, by heating portions of the sensor to elevated temperatures. This mode is essentially the same as the instrument safe mode. No science data are collected while in this mode. The CrIS housekeeping, science/calibration and engineering packets are transmitted during this mode.

#### 4.2.4 Mission Data

The CrIS generates mission data on a regular 8-sec scan cycle. The 8-second scan is broken into forty 200 msec epochs beginning with the 8-sec synchronization pulse from the spacecraft. During proper synchronization, the pulse begins the observation of the first of thirty Earth Scenes. After 30 epochs observing the Earth, the CrIS uses one epoch to slew to the Deep Space view, two epochs to collect calibration interferograms of Deep Space, two epochs to slew to the ICT and two epochs collecting calibration inteferograms of the ICT. During the final three epochs, the CrIS transitions from observing the ICT to the first Earth Scene again. The CrIS scan sequence is shown in Figure 4.2-8.

| 30 Earth | Slew to Space | Dwell at Space | Slew to ICT | Dwell at ICT | Slew to Earth |
|----------|---------------|----------------|-------------|--------------|---------------|
| Samples  | Cal Location  | Cal Location   | Location    | Cal Location | Sample #1     |
| 0.0      | 6.0           | <br>6.2 6      | .6 7        | .0 7         | .4 8.0        |

(Sync)

#### Figure 4.2-8 CrIS Normal Cross-track Scan Sequence (Timing in seconds)

All interferogram packets are formatted alike, though different APIDs contain Earth, Deep Space and ICT views. In Operational mode, the CrIS generates a set of 27 packets for each observing epoch. In Diagnostic Mode, only 3 packets (one per band)

instead of 27 are output for each observing epoch. For interferogram packets, the UTC formatted timestamp in the secondary header (Table 4.1.3) indicates the time at the end of the interferogram sweep (+/- 1 msec). The time of the center of the Interferogram sweep can be determined by post-processing the UTC timestamp utilizing the timestamp bias parameter contained in the Engineering packet.

In addition to the interferogram packets, the CrIS outputs one Science Telemetry Packet per scan, an Engineering packet every 30 scans, 8 LEO&A and 8 housekeeping telemetry packets per scan in Operational Mode. In Diagnostic Mode, the CrIS generates Dwell packets every epoch (40 times per scan or every 200 msec) when requested. When a Memory Dump is requested, packets will come out every 200 msec until the total amount of data requested has been dumped (up to 40 times per scan). The NPP C&T Handbook describes the LEO&A and Housekeeping packet contents. For packets other than interferogram packets, the UTC formatted timestamp in the secondary header (Table 4.1.3) indicates the time the packet is generated.

Packet formats comply with the CCSDS Standards, as tailored for NPOESS use per the FT1394 System IRD. The CCSDS packet fields are in big-endian byte order.

#### 4.2.4.1 Science Data

The CrIS outputs Earth Scene data in APIDs 1315 through 1341 thirty times (once per Earth Scene FOR) every 8 second scan when in Operational Mode. The 30 FORs are output at 200 msec intervals within the scan. The fixed length packets are configurable because the number of samples is fixed for each band and the size of each sample is configurable by command. The default sizes are below and the maximum sizes are included in the footnotes to Table 4.2.2.

| IR Band | Post Processing Bits (for | Number of Samples  |
|---------|---------------------------|--------------------|
|         | each I and Q)             | (for each I and Q) |
| LW      | 18                        | 866                |
| MW      | 17                        | 530                |
| SW      | 15                        | 202                |

 Table 4.2.3 CrIS Operational Interferogram Samples by IR Band

In Operational Mode, each IR band's interferogram samples a different number of complex numbers (see Table 4.2.3). The bit size of each sample after filtering and decimation but before bit trimming differs between bands. These data then pass through the programmable bit trimming process. The bit trimming for each band is divided into up to 16 zones, each with its unique bit trimmed sample length. The start and stop bit of the 40-bit filter response accumulator (defining the trimmed length) and the boundary of each zone is included in the Engineering Packet. Table 4.2.4 documents the default trimmed lengths for the default zones of the LW, MW and SW packets. The bits not used in the last 16-bit word of the I data block and Q data block are filled with zeros.

Figure 4.2-9 shows the format of all Interferogram Packets. The figure labels the packet length as variable because the fixed length packets are configurable and the nine APIDs associated with one IR band may be configured differently than nine APIDs of another IR Band. Table 4.2.5 lists the contents of the User Data field of the Interferogram Packet.

|                                    | Ľ        | N           | W           | S          | W          |            |
|------------------------------------|----------|-------------|-------------|------------|------------|------------|
|                                    | End      | Sample Bit  | End         | Sample Bit | End        | Sample Bit |
|                                    | Sample   | Length      | Sample      | Length     | Sample     | Length     |
|                                    | Index    |             | Index       |            | Index      |            |
| Zone 1                             | 30       | 10          | 199         | 11         | 64         | 6          |
| Zone 2                             | 137      | 12          | 330         | 17         | 137        | 15         |
| Zone 3                             | 298      | 10          | 530         | 11         | 202        | 6          |
| Zone 4                             | 352      | 11          |             |            |            |            |
| Zone 5                             | 406      | 12          |             |            |            |            |
| Zone 6                             | 459      | 18          |             |            |            |            |
| Zone 7                             | 514      | 12          |             |            |            |            |
| Zone 8                             | 567      | 11          |             |            |            | P*         |
| Zone 9                             | 728      | 10          |             |            |            |            |
| Zone 10                            | 836      | 12          |             |            |            |            |
| Zone 11                            | 866      | 10          |             |            |            |            |
| Total                              | 9837 x 2 | = 19674     | 6616 x 2    | = 13232    | 1869 x 2   | 2 = 3738   |
| Interferogram                      |          |             |             |            |            |            |
| Bits                               |          |             |             |            |            |            |
| Total                              | 1230 x 2 | 2 = 2460    | 828 x 2     | = 1656     | 234 x 2    | 2 = 468    |
| Interferogram                      |          |             |             |            |            |            |
| Bytes (after                       |          |             |             |            |            |            |
| zero fill)                         |          |             |             |            |            |            |
| Total Packet 2460 + 14 + 20 = 2494 |          | 1656 + 14 - | + 20 = 1690 | 468 + 14 - | + 20 = 502 |            |
| Bytes,                             |          |             |             |            |            |            |
| including                          |          |             |             |            |            |            |
| header                             |          | 1           |             |            |            |            |

Table 4.2.4 CrIS Default Bit Trimming Output

| CrIS Inter | ierogram Pa                                   | acket             |                   |             |                   |                   |                 |                  | VERSION                   | в                |                         | DATE                    |                           |                  |                 |                                |                                       |                                       |                                               |                    |                    |                 |
|------------|-----------------------------------------------|-------------------|-------------------|-------------|-------------------|-------------------|-----------------|------------------|---------------------------|------------------|-------------------------|-------------------------|---------------------------|------------------|-----------------|--------------------------------|---------------------------------------|---------------------------------------|-----------------------------------------------|--------------------|--------------------|-----------------|
|            |                                               |                   | PACKE'            | T PRIMARY H | IEADER            |                   |                 | SECONDARY        |                           |                  |                         |                         |                           | Us               | er Data Fi      | eld                            |                                       |                                       |                                               |                    |                    | 1               |
|            | Verson No.                                    | Packet            | : Identific       | cation      | Packet S          | Sequence          | Packet          | HEADER           |                           | <b>.</b>         |                         | -                       | CrIS In                   | iterferogram     | n Header        |                                |                                       |                                       | I                                             | Interf             | erogram            | 1               |
|            |                                               | Type<br>Indicator | Sec Hdr<br>Flag   | APID        | Sequence<br>Flags | Sequence<br>Count | bengen          | Start of<br>Scan | PCE App<br>FSW<br>Version | Instrument<br>ID | Scan<br>Informatio<br>n | Scan<br>Status<br>Flags | Impulse<br>Noise<br>Count | ZPD<br>Amplitude | ZPD<br>Location | Number of<br>Convert<br>Pulses | Filter<br>Status<br>Upper<br>Register | Filter<br>Status<br>Lower<br>Register | Number of<br>I Words<br>after Bit<br>Trimming | Detector I<br>Data | Detector Q<br>Data |                 |
| Bits       | 3                                             | 1                 | 1                 | 11          | 2                 | 14                | 16              | 64               | 11                        | 5                | 16                      | 16                      | 16                        | 16               | 16              | 16                             | 16                                    | 16                                    | 16                                            | varies             | varies             | TOTAL<br>varies |
| Octets     |                                               | - 2               | -                 |             | 2                 | 2.                | 2               | 8                |                           | 2                | 2                       | 2                       | 2                         | 2                | 2               | 2                              | 2                                     | 2                                     | 2                                             | varies             | varies             | varies          |
| Value      | 000                                           | 0                 | 1                 | varies      | 11                | varies            | varies          | varies           | varies                    | varies           | varies                  | varies                  | varies                    | varies           | varies          | varies                         | varies                                | varies                                | varies                                        | varies             | varies             | ]               |
|            | Figure 4.2-9 CrlS Interferogram Packet Format |                   |                   |             |                   |                   |                 |                  |                           |                  |                         |                         |                           |                  |                 |                                |                                       |                                       |                                               |                    |                    |                 |
|            |                                               |                   |                   | BA          |                   |                   |                 |                  |                           |                  |                         |                         |                           |                  |                 |                                |                                       |                                       |                                               |                    |                    |                 |
| Check th   | ne NPP (                                      | CCR web           | osite at <u>h</u> | https://cio | ero.eos.          | nasa.gov          | <u>v/npp</u> to | verify th        | at this Is                | the cor          | rect vers               | ion prior               | to use.                   |                  |                 |                                |                                       |                                       |                                               |                    |                    |                 |

Figure 4.2-9 CrIS Interferogram Packet Format

| Start Bit | Bit<br>Size | Mnemonic Name                                                          | Description                                     | Units<br>or<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or<br>State Name | Data Type |
|-----------|-------------|------------------------------------------------------------------------|-------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 11          | INF_SW1ES_PCEAppFSWVer                                                 | PCE Application FSW Version                     | N/A                        | N/A                                                                        | U         |
| 11        | 5           | INF SW1ES InstrumentID                                                 | Instrument ID                                   | N/A                        | N/A                                                                        | U         |
|           | -           |                                                                        |                                                 | 0<br>1-30<br>31<br>32      | ICT<br>Earth Scene #<br>Deep Space<br>UnknownFOR                           |           |
| 16        | 6           | INF_SW1ES_ScanInfo(Field of Regard)                                    | Scan Info(Field of Regard)                      | 33                         | Nadir                                                                      | U         |
|           |             |                                                                        |                                                 | 1 2                        | Reverse<br>Unknown                                                         |           |
| 22        | 2           | INF_SW1ES_ScanInfo(Sweep Dir)                                          | Scan Info(Sweep Direction)                      | 3                          | Unknown                                                                    | U         |
| 24        | 2           | INF_SW1ES_ScanInfo(Spare)                                              | Scan Info(Spare)                                | N/A                        | N/A                                                                        | U         |
| 26        | 1           | reached w/o end of dat ID)                                             | Scan Info(End of PCI Sys Mem w/o EOD ID)        | 1                          | Faise<br>True                                                              | U         |
| 27        | 1           | INF_SW1ES_ScanInfo(I and Q Cnt Stat)                                   | Scan Info(I and Q Count Status)                 | 0<br>1                     | IQ Match<br>IQ Not Match                                                   | U         |
| 28        | 4           | INF_SW1ES_Scaninto(Num Padded Zeros<br>Added)                          | Scan Info(Number of Padded Zeros Added)         | N/A                        | N/A                                                                        | U         |
| 32        | 1           | INF_SW1ES_ScanStatFlg(Invld Interferogram Dat<br>Exceed ZPD Sat Limit) | Scan Stat Flg(Invld IGM Dat-ZPD Sat Lmt)        | 0                          | Valid<br>Invalid                                                           | U         |
| 33        | 1           | INF_SW1ES_ScanStatFlg(I Dat Bit Trim Failure)                          | Scan Stat Flg(I Data Bit Trim Fail)             | 1                          | True                                                                       | U         |
| 34        | 1           | INF_SW1ES_ScanStatFlg(Q Dat Bit Trim Failure)                          | Scan Stat Flg(Q Data Bit Trim Fail)             | 0<br>1                     | False<br>True                                                              | U         |
| 35        | 1           | INF_SW1ES_ScanStatFlg(Fringe Cnt Err-Smple<br>Pulse Err)               | Scan Stat Flg(FCE(Sample Pulse Num Err))        | 0<br>1                     | False<br>True                                                              | U         |
| 36        | 1           | INF_SW1ES_ScanStatFlg(Spare1)                                          | Scan Stat Flg(Spare)                            | N/A                        | N/A                                                                        | U         |
| 37        | 1           | INF SW1ES ScanStatFlo(I Coef Tbl mem Err)                              | Scan Stat Flo(I Coef Table Mem Err)             | 0                          | False<br>True                                                              | U         |
| 20        | 4           |                                                                        | Course Class Flag (O Course Tables Manager Fund | 0                          | False                                                                      |           |
| 30        |             |                                                                        |                                                 | 0                          | False                                                                      | 0         |
| 39        | 1           | INF_SW1ES_ScanStatFlg(Bit Trim Tbl Mem Err)                            | Scan Stat Flg(Bit Trim Tbl Mem Err)             | 1                          | True<br>False                                                              | U         |
| 40        | 1           | INF_SW1ES_ScanStatFlg(Impulse Tbl Mem Err)                             | Scan Stat Flg(Impulse Tbl Mem Err))             | 1                          | True                                                                       | U         |
| 41        | 7           | INF_SW1ES_ScanStatFlg(Spare2)                                          | Scan Stat Flg(Spare)                            | N/A                        | N/A                                                                        | U         |
|           |             | WBATT CH                                                               |                                                 |                            |                                                                            |           |

#### Table 4.2.5 CrIS Interferometer Packet User Data Fields

-

| Start Bit | Bit<br>Size | Mnemonic Name                                                    | Description                              | Units<br>or<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or<br>State Name | Data Type |
|-----------|-------------|------------------------------------------------------------------|------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 48        | 6           | INF_SW1ES_ImpulseNoiseCnt(Spare)                                 | Impulse Noise Count(Spare)               | N/A                        | N/A                                                                        | U         |
| 54        | 10          | INF_SW1ES_ImpulseNoiseCnt(Number Impulses<br>Detected)           | Number of impulses detected              | N/A                        | N/A                                                                        | U         |
| 64        | 6           | INF_SW1ES_ZPDAmpChan(Spare)                                      | ZPD Amplitude(Spare)                     | N/A                        | N/A                                                                        | U         |
| 70        | 10          | INF_SW1ES_ZPDAmpChan(ZPD Amp)                                    | ZPD Amp (Bits 4-13 of the A/D Converter) | N/A                        | -, -, -, 16,0                                                              | s         |
| 80        | 16          | INF_SW1ES_ZPDLocChan(ZPD Location)                               | ZPD Location                             | N/A                        | N/A                                                                        | s         |
| 96        | 16          | INF_SW1ES_NumConvPulses(Total Num of<br>Interfer Conv Pulses rcv | Num Interferometer Convert Pulses Recv   | 0                          | N/A                                                                        | U         |
| 112       | 5           | INF_SW1ES_FilterStatUpperrReg(Not Used)                          | Fltr Stat Up Reg(Not Used)               | N/A                        | N/A                                                                        | U         |
| 117       | 1           | INF_SW1ES_FilterStatUpperrReg(Num Output<br>Filter Sample Err)   | Fltr Stat Up Reg(Num Out Fltr Samp Err)  | 0                          | False<br>True                                                              | U         |
| 118       | 1           | INF_SW1ES_FilterStatUpperrReg(Spare)                             | Fitr Stat Up Reg(Spare)                  | N/A                        | N/A                                                                        | U         |
| 119       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#9)                  | Fltr Stat Up Reg(Busy Time-Out AD #9)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 120       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#8)                  | Fltr Stat Up Reg(Busy Time-Out AD #8)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 121       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#7)                  | Fltr Stat Up Reg(Busy Time-Out AD #7)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 122       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#6)                  | Fltr Stat Up Reg(Busy Time-Out AD #6)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 123       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#5)                  | Fltr Stat Up Reg(Busy Time-Out AD #5)    | 0                          | No Timeout<br>Timeout                                                      | U         |
| 124       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#4)                  | Fltr Stat Up Reg(Busy Time-Out AD #4)    | 0                          | No Timeout<br>Timeout                                                      | U         |
| 125       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#3)                  | Fltr Stat Up Reg(Busy Time-Out AD #3)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 126       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#2)                  | Fltr Stat Up Reg(Busy Time-Out AD #2)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 127       | 1           | INF_SW1ES_FilterStatUpperrReg(Busy TO AD<br>#1)                  | Fltr Stat Up Reg(Busy Time-Out AD #1)    | 0<br>1                     | No Timeout<br>Timeout                                                      | U         |
| 128       | 3           | INF_SW1ES_FilterStatLowerReg(FIR Revision<br>Reg)                | Fltr Stat Low Reg(FIR Revision Reg)      | N/A                        | N/A                                                                        | U         |
|           |             | DB/III C                                                         |                                          |                            |                                                                            |           |

#### Table 4.2.5 CrlS Interferometer Packet User Data Fields (cont)

| Start Bit | Bit    | Mnemonic Name                                                 | Description                                                | Units<br>or | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or | Data Type |
|-----------|--------|---------------------------------------------------------------|------------------------------------------------------------|-------------|--------------------------------------------------------------|-----------|
|           | Size   |                                                               |                                                            | State Value | State Name                                                   |           |
|           |        |                                                               |                                                            | 0           | Bank 1                                                       |           |
| 131       | 1      | INF_SW1ES_FilterStatLowerReg(System Proc Last Bnk Filled)     | Fitr Stat Low Reg(Sys Prc Last Bnk Full)                   | 1           | Bank 2                                                       | U         |
| 132       | 1      | INE_SW1ES_FilterStatLowerReg(Reserved)                        | Fitr Stat Low Reg(Reserved)                                | N/A         | N/A                                                          | U         |
| 102       |        |                                                               |                                                            | 24          | channel 1                                                    | -         |
|           |        |                                                               |                                                            | 25          | channel 2                                                    |           |
|           |        |                                                               |                                                            | - 26        | channel 3                                                    |           |
|           |        |                                                               |                                                            | 27          | channel 4                                                    |           |
|           |        |                                                               |                                                            | 20          | channel 5                                                    |           |
|           |        |                                                               |                                                            | 21          | channel 6                                                    |           |
|           |        |                                                               |                                                            | 22          | channel 7                                                    |           |
|           |        |                                                               |                                                            | 23          | channel 8                                                    |           |
|           |        |                                                               |                                                            | 12          | channel 9                                                    |           |
|           |        |                                                               |                                                            | 13-15       | NotUsed                                                      |           |
| 133       | 5      | INF_SW1ES_FilterStatLowerReg(Diag Mode Chan Sel)              | Fitr Stat Low Reg(Diag Mode Chan Sel)                      | all others  | invalid                                                      | U         |
|           |        |                                                               |                                                            | 0           | Disabled                                                     |           |
| 138       | 1      | INF_SW1ES_FilterStatLowerReg(Diag Mode En/Disabled)           | Fltr Stat Low Reg(Diag Mode En/Disable)                    | 1           | Enabled                                                      | U         |
|           |        |                                                               |                                                            | 0           | Enabled                                                      |           |
| 139       | 1      | INF_SW1ES_FilterStatLowerReg(Byte Swp Mode)                   | Fltr Stat Low Reg(Byte Swap Mode)                          | 1           | Disabled                                                     | U         |
|           |        |                                                               |                                                            | 0           | False                                                        |           |
| 140       | 1      | INF_SW1ES_FilterStatLowerReg(Num of Sample Pulse Err)         | Fitr Stat Low Reg(Num Smpl Pulse Err)                      | 1           | True                                                         | U         |
|           |        |                                                               |                                                            | 0           | False                                                        |           |
| 141       | 1      | INF_SW1ES_FilterStatLowerReg(Coef Set #2 Chksum Err)          | Fitr Stat Low Reg(Coef 2 Chk sum Err)                      | 1           | Irue                                                         | U         |
| 142       | 4      | INE_SWIES_EiterStatt awarBag(Coof Sat #1 Obkaum Err)          | Elte Stat Low Bog(Coof 1 Chk sum Erc)                      | 1           | Faise                                                        |           |
| 142       | -      | INF_SWTES_FILEFStatLowerReg(Coer Set #1 Criksum EII)          | Fill Stal LOW Reg(COPTI CIRK suff EIT)                     | 0           | False                                                        | U         |
| 143       | 1      | INE_SW1ES_EilterStatLowerReg(Impulse Mek Err)                 | Fitr Stat Low Reg(Impulse Mask Error)                      | 1           | True                                                         |           |
| 145       |        | INF_SW1ES_NumIDatWrdAftrBitTrim(Total Num of I Wrds After Bit | The otal Low reg(inpulse mask Life)                        |             | The                                                          | 0         |
| 144       | 16     | Trim)                                                         | Number of I Words After Bit Trimming                       | N/A         | N/A                                                          | U         |
|           |        | ,                                                             |                                                            | 1           |                                                              |           |
| 160       | varies | INF_SW1ES_DetectorData                                        | Detector Data Bit Trimmed Interferogram Data (I) 1st word  | N/A         | N/A                                                          | U         |
|           |        |                                                               |                                                            |             |                                                              |           |
| varies    | varies | INF_SW1ES_DetectorData                                        | Detector Data Bit Trimmed Interferogram Data (I) Last word | N/A         | N/A                                                          | U         |
|           |        |                                                               |                                                            |             | 14                                                           |           |
| varies    | varies | INF_SW1ES_DetectorData                                        | Detector Data Bit Trimmed Interferogram Data (Q) 1st word  | N/A         | N/A                                                          | 0         |
| varies    | varies | INE_SW1ES_DetectorData                                        | Detector Data Rit Trimmed Interferogram Data (O) Last word | N/A         | N/A                                                          | ш         |
|           |        | DB/III CHA                                                    |                                                            |             |                                                              |           |

| Table 4.2.5 | CrIS Interferometer | Packet User Da | ta Fields (cont) |
|-------------|---------------------|----------------|------------------|
|-------------|---------------------|----------------|------------------|

#### 4.2.4.2 Calibration Data

The CrIS outputs Deep Space view data in APIDs 1342 through 1368 and Internal Calibration Target view data in APIDs 1369 to 1395. The SSM spends two epochs at each location so each of the APIDs above is generated twice every 8 second scan when in Operational Mode. The packet format and user data fields for these APIDs are identical to the Science Data APIDs. Refer to Figure 4.2-9 for the format and Table 4.2.5 for the User Data field contents of the calibration packets.

The CrIS also outputs one Science/Calibration Telemetry Packet in APID 1289 every 8 second scan. This packet contains Calibration Resistor temperature and ICT temperatures measured during all 40 epochs of the scan. Servo pointing errors are available when the SSM points to the 30 earth FORs. Additional fields are added to the first epoch observing the ICT. The packet has a fixed length of 560 octets. Figure 4.2-10 shows the format of APID 1289. Table 4.2.6 lists the contents of the User Data Mining and a second sec field of the Science/Calibration Telemetry Packet.

| CrIS Eigh | t Second S                                         | cience Tele       | metry Pac       | ket         |                   |                   |                  |                           | VERSION                                      | в                                          |                                             | DATE                                      |                                            |                                   |                                        |                                                    |                                                    |                                             |                                                    |                                            |                                         |                                         |                                                                 |                                                          |                                                     |          |
|-----------|----------------------------------------------------|-------------------|-----------------|-------------|-------------------|-------------------|------------------|---------------------------|----------------------------------------------|--------------------------------------------|---------------------------------------------|-------------------------------------------|--------------------------------------------|-----------------------------------|----------------------------------------|----------------------------------------------------|----------------------------------------------------|---------------------------------------------|----------------------------------------------------|--------------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------|----------|
|           | <b></b>                                            |                   | DACKE           | T DDIMDDV   | UFADED            |                   |                  | SECONDARY                 |                                              |                                            |                                             |                                           |                                            |                                   |                                        | Us                                                 | er Data Fie                                        | eld                                         |                                                    |                                            | -                                       |                                         |                                                                 |                                                          | 1                                                   |          |
|           | Verson No.                                         | . Packe           | t Identifi      | cation      | Packet            | Sequence          | Packet           | Start of                  |                                              |                                            |                                             |                                           | Epoch 1 Ini                                | Eo                                |                                        | Epoch 2                                            | Epoch 3                                            |                                             |                                                    |                                            | Epoch 4 In:                             | Eo                                      |                                                                 |                                                          |                                                     |          |
|           |                                                    | Type<br>Indicator | Sec Hdr<br>Flag | APID        | Sequence<br>Flags | Sequence<br>Count | Length           | Scan                      | PCE App<br>FSW<br>Version                    | Instrument<br>ID                           | IE CCA Cal<br>Resistor<br>Temp<br>(epoch 1) | Low Range<br>Cal<br>Resistor<br>(epoch 1) | High Range<br>Cal<br>Resistor<br>(epoch 1) | #1 (epoch<br>#1 ()<br>1)          | ICT Temp<br>#2 (epoch<br>1)            | Resistor<br>and ICT<br>Temps*                      | Resistor<br>and ICT<br>Temps*                      | IE CCA Cal<br>Resistor<br>Temp<br>(epoch 4) | Low Range<br>Cal<br>Resistor<br>(epoch 4)          | High Range<br>Cal<br>Resistor<br>(epoch 1) | e ICT Temp<br>#1 (epoch<br>4)           | #2 (epoch<br>4)                         | Cross-<br>Track<br>Servo<br>Error<br>(sample<br>21, epoch<br>4) | In-Track<br>Servo<br>Error<br>(sample<br>21, epoch<br>4) |                                                     |          |
| pi+,      |                                                    | 1                 | 1               | 11          | 2                 | 14                | 16               | 6A                        | 11                                           | 6                                          | 16                                          | 16                                        | 16                                         | 16                                | 1.6                                    | 90                                                 | 90                                                 | 16                                          | 16                                                 | 16                                         | 16                                      | 16                                      | 16                                                              | 16                                                       | subtotal                                            | 1TOTAL   |
| DIU       |                                                    | 1                 | T               | 11          |                   | 14                | 10               | 04                        | 11                                           | 2                                          | 20                                          | 2                                         | 20                                         | 20                                | 2                                      | 10                                                 | 10                                                 | 20                                          | 2                                                  | 2 2                                        | 20                                      | 20                                      | 2                                                               | 2                                                        | 400                                                 | 4400     |
| Value     | 000                                                |                   | 1               | 0×509       | 11                | varioe            | 0×0229           | o                         | warioe                                       | 4 varioe                                   | varies                                      | variae                                    | variae                                     | varies                            | varies                                 | warioe                                             | warioe                                             | 70506                                       | varies                                             | variae                                     | varies                                  | varies                                  | varies                                                          | varies                                                   | 00                                                  |          |
| /         |                                                    | Telem             | etry Packet     |             | leader Presen     | t                 |                  |                           |                                              |                                            |                                             | Hear Data                                 | Field                                      |                                   |                                        |                                                    |                                                    |                                             |                                                    |                                            |                                         |                                         |                                                                 | _                                                        |                                                     | 1        |
| 1         | Epoch 5                                            |                   | Epoch 6 t       | to 33 Info  |                   | Epoch 3           | 4 to 38          |                           |                                              | Epoch 39                                   |                                             | USEI Daca                                 | 11610                                      |                                   |                                        | -                                                  |                                                    |                                             |                                                    |                                            |                                         |                                         |                                                                 |                                                          | Epoch 40                                            | 1        |
|           | Resistor<br>and ICT<br>Temps,<br>Servo<br>Errors** | Resistor          | and ICT Te      | emps, Servo | Errors**          | Resistor<br>Temps | and ICT<br>only* | Laser<br>Diode<br>Current | IE CCA Cal<br>Resistor<br>Temp<br>(epoch 39) | Low Range<br>Cal<br>Resistor<br>(epoch 39) | High Range<br>Cal<br>Resistor<br>(epoch 39) | ICT Temp<br>#1 (epoch<br>39)              | ICT Temp<br>#2 (epoch<br>39)               | Laser<br>Diode Temp<br>(epoch 39) | Beamsplitt<br>er Temp #1<br>(epoch 39) | OMA<br>Structure<br>Input Temr<br>#1 (epoch<br>39) | OMA<br>Structure<br>Input Temp<br>#2 (epoch<br>39) | SSM Scan<br>Mirror<br>Temp<br>(epoch 39)    | SSM Scan<br>Mirror<br>Baffle<br>Temp<br>(epoch 39) | Stage 2<br>Cooler<br>Temp<br>(epoch 39)    | Stage 4<br>Cooler<br>Temp<br>(epoch 39) | Stage 1<br>Cooler<br>Temp<br>(epoch 39) | Stage 3<br>Cooler<br>Temp<br>(epoch 39)                         | Telescope<br>Temp #1<br>(epoch 39)                       | Resistor<br>and ICT<br>Temps only<br>(epoch<br>40)* | subtotal |
|           | 112                                                |                   | 33              | 136         |                   | 4(                | 00               | 16                        | 16                                           | 16                                         | 16                                          | 16                                        | 16                                         | 16                                | 16                                     | 16                                                 | 16                                                 | 16                                          | 16                                                 | 16                                         | 16                                      | 16                                      | 16                                                              | 16                                                       | 80                                                  | 4000     |
|           | 14                                                 |                   | 3               | 92          |                   | 5                 | 0                | 2                         | 2                                            | 2                                          | 2                                           | 2                                         | 2                                          | 2                                 | 2                                      | 2                                                  | 2                                                  | 2                                           | 2                                                  | 2                                          | 2                                       | 2                                       | 2                                                               | 2                                                        | 10                                                  | 500      |
|           | varies                                             |                   | vai             | ries        |                   | var               | ies              | varies                    | varies                                       | varies                                     | varies                                      | varies                                    | varies                                     | varies                            | varies                                 | varies                                             | varies                                             | varies                                      | varies                                             | varies                                     | varies                                  | varies                                  | varies                                                          | varies                                                   | varies                                              |          |

\* Fields for these epochs are identical to Epoch 1 \*\* Fields for these epochs are identical to Epoch 4

# Figure 4.2-10 CrIS Science/Calibration Telemetry Packet Format

o Cris Scien.

|           | Bit     |                                                             |                                            | Units           | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |          |
|-----------|---------|-------------------------------------------------------------|--------------------------------------------|-----------------|--------------------------------------------------------|----------|
| Start Bit | Size    | Mnemonic Name                                               | Description                                | or              | or                                                     | Data Typ |
|           | 0120    |                                                             |                                            | State Value     | State Name                                             |          |
| 0         | 11      | 8Sec SciCalib PCEAppFSWVer                                  | PCE Application FSW Version                | N/A             | N/A                                                    | U        |
| 11        | 5       | 8Sec SciCalib InstrumentID                                  | Instrument ID                              | N/A             | N/A                                                    | U        |
| 16        | 2       | 8Sec SciCalib IECCACalibResistorTemp(epoch1 - Spare)        | IE CCA Cal Resistor Temp - epoch 1 - Spare | N/A             | N/A                                                    | Ŭ        |
| 18        | 14      | 8Sec SciCalib IECCACalibResistorTemp(epoch1)                | IE CCA Cal Resistor Temp - epoch 1         | °C              | 0. 0. 0.006324509. 23.61571478                         | S        |
| 32        | 2       | 8Sec SciCalib LowRangeCalibResistor(epoch1 - Spare)         | Low Range Cal Resistor - epoch 1 - Spare   | N/A             | N/A                                                    | Ű        |
| 34        | 14      | 8Sec SciCalib LowRangeCalibResistor(epoch1)                 | Low Range Cal Resistor - epoch 1           | °C              | 0. 0. 0.006324509. 23.61571478                         | S        |
| 48        | 2       | 8Sec SciCalib HighRangeCalibResistor(epoch1 - Spare)        | High Range Cal Resistor - epoch 1 - Spare  | N/A             | N/A                                                    | Ú        |
| 50        | 14      | 8Sec SciCalib HighRangeCalibResistor(epoch1)                | High Range Cal Resistor - epoch 1          | °C              | 0.0.0.006324509.23.61571478                            | S        |
| 64        | 2       | 8Sec SciCalib ICTTemp#1(epoch1 - Spare)                     | ICT Temp 1 - epoch 1 - Spare               | N/A             | N/A                                                    | U        |
| 66        | 14      | 8Sec SciCalib ICTTemp#1(epoch1)                             | ICT Temp 1 - epoch 1                       | °C              | 6.43737E-09. 0.006293816. 22.92502969                  | S        |
| 80        | 2       | 8Sec SciCalib ICTTemp#2(epoch1 - Spare)                     | ICT Temp 2 - epoch 1 - Spare               | N/A             | N/A                                                    | Ū        |
| 82        | 14      | 8Sec. SciCalib ICTTemp#2(epoch1)                            | ICT Temp 2 - epoch 1                       | °C              | 6.05758E-09.0.006313351.23.5785997                     | S        |
| 96        | 2       | 8Sec. SciCalib IECCACalibResistorTemp(epoch2 - Spare)       | IE CCA Cal Resistor Temp - epoch 2 - Spare | N/A             | N/A                                                    | - ŭ      |
| 98        | 14      | 8Sec. SciCalib IECCACalibResistorTemp(epoch2)               | IF CCA Cal Resistor Temp - epoch 2         | °C              | 0.0.0.006324509 23.61571478                            | Š        |
| 112       | 2       | 8Sec. SciCalib LowRangeCalibResistor(enoch2 - Spare)        | I ow Bange Cal Resistor - enoch 2 - Spare  | N/A             | Ν/Δ                                                    | - ŭ      |
| 114       | 14      | 8Sec. SciCalib LowRangeCalibResistor(epoch2)                | Low Range Cal Resistor - epoch 2           | °C              | 0 0 0 006324509 23 61571478                            | s        |
| 128       | 2       | 8Sec. SciCalib, HighRangeCalibResistor(epoch2 - Spare)      | High Range Cal Resistor - enoch 2 - Spare  | N/A             | -, -, 0, 0, 0.000024000, 20.01071470                   | - ŭ      |
| 120       | 1/      | 8Sec. SciCalib, HighRangeCalibResistor(epoch2 - Opare)      | High Range Cal Resistor - epoch 2          | °C              |                                                        |          |
| 144       | 2       | 8Sec_SciCalib_ICTTemp#1(epoch2_Spare)                       | ICT Temp 1 epoch 2 Spare                   | N/A             | -, -, 0, 0, 0.000324303, 23.01071470                   |          |
| 144       | 14      | See SeiCalib_ICTTemp#1(epoch2 - Spare)                      | ICT Tomp 1 open 2                          | N/A             | 6 42727E 00 0 006202816 22 02502060                    | 0        |
| 140       | 14      | Soc_SciCalib_ICTTemp#7(epoch2)                              | ICT Temp 2 enoub 2 Spars                   | N/A             | -, -, -, 0.43737E-09, 0.000233010, 22.92302909         |          |
| 160       | 2<br>14 | See SeiCelib ICTTemp#2(epoch2 - Spare)                      | ICT Temp 2 - epoch 2                       | N/A<br>°C       |                                                        | 0        |
| 102       | 14      | Sec_SciCalib_ICTTemp#2(epoch2)                              | ICT Temp 2 - epoch 2                       | U NI/A          | -, -, -, 0.03736E-09, 0.000313331, 23.3763997          | 3        |
| 170       |         | osec_scicalib_lECCACalibResisionTemp(epochs - Spare)        | IE CCA Cal Resistor Temp - epoch 3 - Spare | IN/A            | N/A                                                    | 0        |
| 1/0       | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epoch3)                | IE COA Cal Resistor Temp - epoch 3         |                 | -, -, 0, 0, 0.006324509, 23.61571478                   | 5        |
| 192       | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch3 - Spare)         | Low Range Cal Resistor - epoch 3 - Spare   | N/A             | N/A                                                    | 0        |
| 194       | 14      | 6Sec_SciCalib_LowRangeCalibResistor(epoch3)                 | Low Range Cal Resistor - epoch 3           |                 | -, -, 0, 0, 0.006324509, 23.01571476                   | 5        |
| 208       | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch3 - Spare)        | High Range Cal Resistor - epoch 3 - Spare  | N/A             | N/A                                                    | 0        |
| 210       | 14      | oSec_SciCalib_HighRangeCalibResistol(epochs)                | High Range Cal Resistor - epoch 3          |                 | -, -, 0, 0, 0.006324509, 23.01571476                   | 5        |
| 224       | 2       | 8Sec_SciCalib_ICTTemp#T(epoch3 - Spare)                     | ICT Temp 1 - epoch 3 - Spare               | N/A             | N/A                                                    | 0        |
| 220       | 14      | 8Sec_SciCalib_ICTTemp#1(epoch3)                             | ICT Temp 1 - epoch 3                       | -C              | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | 5        |
| 240       | 2       | 8Sec_SciCalib_ICTTemp#2(epoch3 - Spare)                     | ICT Temp 2 - epoch 3 - Spare               | N/A             | N/A                                                    | 0        |
| 242       | 14      | 8Sec_SciCalib_ICTTemp#2(epoch3)                             | ICT Temp 2 - epoch 3                       | -C              | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | 5        |
| 256       | 2       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch4 - Spare)        | IE CCA Cal Resistor Temp - epoch 4 - Spare | N/A             | N/A                                                    | 0        |
| 258       | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epocn4)                | IE CCA Cal Resistor Temp - epoch 4         | *C              | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |
| 272       | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch4 - Spare)         | Low Range Cal Resistor - epoch 4 - Spare   | N/A             | N/A                                                    | 0        |
| 2/4       | 14      | 8Sec_SciCalib_LowRangeCalibResistor(epoch4)                 | Low Range Cal Resistor - epoch 4           | °С              | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |
| 288       | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch4 - Spare)        | High Range Cal Resistor - epoch 4 - Spare  | N/A             | N/A                                                    | U        |
| 290       | 14      | 8Sec_SciCalib_HighRangeCalibResistor(epoch4)                | High Range Cal Resistor - epoch 4          | °C              | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |
| 304       | 2       | 8Sec_SciCalib_ICTTemp#1(epoch4 - Spare)                     | ICT Temp 1 - epoch 4 - Spare               | N/A             | N/A                                                    | U        |
| 306       | 14      | 8Sec_SciCalib_ICTTemp#1(epoch4)                             | ICT Temp 1 - epoch 4                       | °C              | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S        |
| 320       | 2       | 8Sec_SciCalib_ICTTemp#2(epoch4 - Spare)                     | ICT Temp 2 - epoch 4 - Spare               | N/A             | N/A                                                    | U        |
| 322       | 14      | 8Sec_SciCalib_ICTTemp#2(epoch4)                             | ICT Temp 2 - epoch 4                       | °C              | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S        |
| 336       | 16      | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 4)           | CrTrk Servo Error - sample 21, epoch 4     | N/A             | -, -, 0, 0, 2.996, 0                                   | S        |
| 352       | 16      | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 4)              | InTrk Servo Error - sample 21, epoch 4     | N/A             | -, -, 0, 0, 0.5645, 0                                  | S        |
| 368       | 2       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch5 - Spare)        | IE CCA Cal Resistor Temp - epoch 5 - Spare | N/A             | N/A                                                    | U        |
| 370       | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epoch5)                | IE CCA Cal Resistor Temp - epoch 5         | °C              | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |
| 384       | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch5 - Spare)         | Low Range Cal Resistor - epoch 5 - Spare   | N/A             | N/A                                                    | U        |
| 386       | 14      | 8Sec_SciCalib_LowRangeCalibResistor(epoch5)                 | Low Range Cal Resistor - epoch 5           | °C              | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |
| 400       | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch5 - Spare)        | High Range Cal Resistor - epoch 5 - Spare  | N/A             | N/A                                                    | U        |
| 402       | 14      | <pre>&amp;Sec_SciCalib_HighRangeCalibResistor(epoch5)</pre> | High Range Cal Resistor - epoch 5          | <sup>О°</sup> I | -, -, 0, 0, 0.006324509, 23.61571478                   | S        |

|            | Bit     |                                                        |                                                                                 | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|------------|---------|--------------------------------------------------------|---------------------------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit  | Size    | Mnemonic Name                                          | Description                                                                     | or          | or                                                     | Data Type |
|            | 0120    |                                                        |                                                                                 | State Value | State Name                                             |           |
| 416        | 2       | 8Sec_SciCalib_ICTTemp#1(epoch5 - Spare)                | ICT Temp 1 - epoch 5 - Spare                                                    | N/A         | N/A                                                    | U         |
| 418        | 14      | 8Sec_SciCalib_ICTTemp#1(epoch5)                        | ICT Temp 1 - epoch 5                                                            | °C          | -, -, 6.43737E-09, 0.006293816, 22.92502969            | S         |
| 432        | 2       | 8Sec_SciCalib_ICTTemp#2(epoch5 - Spare)                | ICT Temp 2 - epoch 5 - Spare                                                    | N/A         | N/A                                                    | U         |
| 434        | 14      | 8Sec_SciCalib_ICTTemp#2(epoch5)                        | ICT Temp 2 - epoch 5                                                            | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 448        | 16      | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 5)      | CrTrk Servo Error - sample 21, epoch 5                                          | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 464        | 16      | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 5)         | InTrk Servo Error - sample 21, epoch 5                                          | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 480        | 2       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch6 - Spare)   | IE CCA Cal Resistor Temp - epoch 6 - Spare                                      | N/A         | N/A                                                    | U         |
| 482        | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epoch6)           | IE CCA Cal Resistor Temp - epoch 6                                              | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 496        | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch6 - Spare)    | Low Range Cal Resistor - epoch 6 - Spare                                        | N/A         | N/A                                                    | U         |
| 498        | 14      | 8Sec_SciCalib_LowRangeCalibResistor(epoch6)            | Low Range Cal Resistor - epoch 6                                                | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 512        | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch6 - Spare)   | High Range Cal Resistor - epoch 6 - Spare                                       | N/A         | N/A                                                    | U         |
| 514        | 14      | 8Sec_SciCalib_HighRangeCalibResistor(epoch6)           | High Range Cal Resistor - epoch 6                                               | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 528        | 2       | 8Sec SciCalib ICTTemp#1(epoch6 - Spare)                | ICT Temp 1 - epoch 6 - Spare                                                    | N/A         | N/A                                                    | U         |
| 530        | 14      | 8Sec SciCalib ICTTemp#1(epoch6)                        | ICT Temp 1 - epoch 6                                                            | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 544        | 2       | 8Sec SciCalib ICTTemp#2(epoch6 - Spare)                | ICT Temp 2 - epoch 6 - Spare                                                    | N/A         | N/A                                                    | U         |
| 546        | 14      | 8Sec SciCalib ICTTemp#2(epoch6)                        | ICT Temp 2 - epoch 6                                                            | °C          | 6.05758E-09. 0.006313351. 23.5785997                   | S         |
| 560        | 16      | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 6)      | CrTrk Servo Error - sample 21, epoch 6                                          | N/A         | 0. 0. 2.996. 0                                         | Ū         |
| 576        | 16      | 8Sec SciCalib InTrkServoErr(sample 21 epoch 6)         | InTrk Servo Error - sample 21, epoch 6                                          | N/A         | 0. 0. 0.5645. 0                                        | S         |
| 592        | 2       | 8Sec SciCalib IECCACalibResistorTemp(epoch7 - Spare)   | IE CCA Cal Resistor Temp - epoch 7 - Spare                                      | N/A         | N/A                                                    | Ū         |
| 594        | 14      | 8Sec SciCalib IECCACalibResistorTemp(epoch7)           | IF CCA Cal Resistor Temp - epoch 7                                              | °C          | 0 0 0 006324509 23 61571478                            | S         |
| 608        | 2       | 8Sec. SciCalib LowRangeCalibResistor(epoch7 - Spare)   | Low Range Cal Resistor - epoch 7 - Spare                                        | N/A         | N/A                                                    | Ŭ         |
| 610        | - 14    | 8Sec. SciCalib LowRangeCalibResistor(epoch7)           | Low Range Cal Resistor - enoch 7                                                | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 624        | 2       | 8Sec. SciCalib HighRangeCalibResistor(epoch7 - Spare)  | High Range Cal Resistor - epoch 7 - Spare                                       | N/A         | N/A                                                    | Ŭ         |
| 626        | - 14    | 8Sec. SciCalib, HighRangeCalibResistor(epoch7)         | High Range Cal Resistor - enoch 7                                               | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 640        | 2       | 8Sec SciCalib ICTTemp#1(epoch7 - Spare)                | ICT Temp 1 - epoch 7 - Spare                                                    | N/A         | N/A                                                    | Ū         |
| 642        | - 14    | 8Sec. SciCalib ICTTemp#1(epoch7)                       | ICT Temp 1 - epoch 7                                                            | °C          | 6 43737E-09 0 006293816 22 92502969                    | ŝ         |
| 656        | 2       | 8Sec. SciCalib ICTTemn#2(epoch7 - Spare)               | ICT Temp 2 - enoch 7 - Snare                                                    | N/A         | N/A                                                    | Ű         |
| 658        | 14      | 8Sec. SciCalib ICTTemp#2(epoch7)                       | ICT Temp 2 - enoch 7                                                            | 0°          | 6 05758E-09 0 006313351 23 5785997                     | S         |
| 672        | 16      | 8Sec. SciCalib. CrossTrkServoErr(sample 21 enoch 7)    | CrTrk Servo Error - sample 21 epoch 7                                           | N/A         | 0.0.2.996.0                                            | s         |
| 688        | 16      | 8Sec. SciCalib. InTrkServoErr(sample 21 epoch 7)       | InTrk Servo Error - sample 21, epoch 7                                          | N/A         | 0.0.05645.0                                            | S         |
| 704        | 2       | 8Sec. SciCalib IECCACalibResistorTemp(enoch8 - Spare)  | IF CCA Cal Resistor Temp - enoch 8 - Spare                                      | N/A         | N/A                                                    | - ŭ       |
| 706        | - 14    | 8Sec. SciCalib IECCACalibResistorTemp(epoch8)          | IF CCA Cal Resistor Temp - epoch 8                                              | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 720        | 2       | 8Sec. SciCalib LowRangeCalibResistor(enoch8 - Spare)   | Low Range Cal Resistor - enoch 8 - Snare                                        | N/A         | N/A                                                    | - ŭ       |
| 722        | - 14    | 8Sec. SciCalib LowRangeCalibResistor(epoch8)           | Low Range Cal Resistor - enoch 8                                                | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 736        | 2       | 8Sec. SciCalib HighRangeCalibResistor(epoch8 - Spare)  | High Range Cal Resistor - enoch 8 - Snare                                       | N/A         | N/A                                                    | - ŭ       |
| 738        | 14      | 8Sec. SciCalib, High RangeCalibResistor(epoch8)        | High Range Cal Resistor - enoch 8                                               | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 752        | 2       | 8Sec. SciCalib. ICTTemp#1(enoch8 - Spare)              |                                                                                 | N/A         | N/A                                                    | - ŭ       |
| 754        | 14      | 8Sec. SciCalib ICTTemp#1(epoch8)                       | ICT Temp 1 - enoch 8                                                            | °C          | 6.43737E-09.0.006293816.22.92502969                    | ŝ         |
| 768        | 2       | 8Sec SciCalib ICTTemp#2(enoch8 - Spare)                | ICT Temp 2 - epoch 8 - Spare                                                    | N/A         | , , , ο.407012.00, 0.000200010, 22.02002000            |           |
| 700        | 1/      | 8Sec. SciCalib_ICTTemp#2(epoch6-opare)                 | ICT Temp 2 - epoch 8                                                            | ۱۹/۸<br>۰C  | 6.05758E-00.0.006313351.23.5785007                     |           |
| 784        | 16      | 8Sec. SciCalib. CrossTrkServoErr(sample 21 epoch 8)    | CrTrk Servo Error - sample 21 enoch 8                                           | N/A         | 0 0 2 996 0                                            | - S       |
| 800        | 16      | 8Sec. SciCalib. InTrkServoErr(sample 21 epoch 8)       | InTrk Servo Error - sample 21, epoch 6                                          | N/A         | -, -, 0, 0, 2.000, 0                                   | - s       |
| 816        | 2       | 8Sec. SciCalib_IECCACalibResistorTemp(anoch0_Spore)    | IFTIC OFINE LITER - Sample 21, epoch 0                                          | N/A         | -, -, 0, 0, 0.00+0, 0<br>ΝΙΔ                           |           |
| 818        | 2<br>14 | 8Sec. SciCalib IECCACalibResistorTemp(cpoch9)          | IE COA Cal Resistor Temp - epoch 9                                              | •∩          |                                                        |           |
| 832        | 2       | 8Sec. SciCalib LowPangeCalibResistor(enoch9, Spara)    | Low Pange Cal Resistor - enoch 0 - Spare                                        | N/A         | -, -, 0, 0, 0.000324009, 23.01071470<br>N/A            |           |
| 834        | 2<br>14 | 8Sec SciCalib LowRangeCalibResistor(epoch)             | Low Pange Cal Resistor - epoch 9 - Spare                                        | 1N/A        |                                                        |           |
| 004<br>0/0 | 14      | 8Sec SciCalib HighDangeCalibResister(apach) Sector     | Luw Nalige Odi Nesisiui - epuoli 3<br>High Pange Cal Pasister - anado 0 - Shara | N/A         | -, -, 0, 0, 0.000324303, 23.01371470<br>NI/A           |           |
| 850        | 14      | 8Sec. SciCalib, HighRangeCalibResistor(epoch9 - Spare) | High Range Cal Resistor - epoch 9                                               | °C          | 0 0 0 006324509 23 61571478                            | - S       |
|            |         |                                                        |                                                                                 | I Š         | , , , , , ,                                            |           |
|            |         |                                                        |                                                                                 |             |                                                        |           |

|           | Rit  |                                                         |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|---------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name                                           | Description                                 | or          | or                                                     | Data Type |
|           | 0120 |                                                         |                                             | State Value | State Name                                             |           |
| 864       | 2    | 8Sec_SciCalib_ICTTemp#1(epoch9 - Spare)                 | ICT Temp 1 - epoch 9 - Spare                | N/A         | N/A                                                    | U         |
| 866       | 14   | 8Sec_SciCalib_ICTTemp#1(epoch9)                         | ICT Temp 1 - epoch 9                        | °C          | 🥿 🚬 -, -, 6.43737E-09, 0.006293816, 22.92502969        | S         |
| 880       | 2    | 8Sec_SciCalib_ICTTemp#2(epoch9 - Spare)                 | ICT Temp 2 - epoch 9 - Spare                | N/A         | N/A                                                    | U         |
| 882       | 14   | 8Sec_SciCalib_ICTTemp#2(epoch9)                         | ICT Temp 2 - epoch 9                        | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 896       | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 9)       | CrTrk Servo Error - sample 21, epoch 9      | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 912       | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 9)          | InTrk Servo Error - sample 21, epoch 9      | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 928       | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch10 - Spare)   | IE CCA Cal Resistor Temp - epoch 10 - Spare | N/A         | N/A                                                    | U         |
| 930       | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch10)           | IE CCA Cal Resistor Temp - epoch 10         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 944       | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch10 - Spare)    | Low Range Cal Resistor - epoch 10 - Spare   | N/A         | N/A                                                    | U         |
| 946       | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch10)            | Low Range Cal Resistor - epoch 10           | D°          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 960       | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch10 - Spare)   | High Range Cal Resistor - epoch 10 - Spare  | N/A         | N/A                                                    | U         |
| 962       | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch10)           | High Range Cal Resistor - epoch 10          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 976       | 2    | 8Sec_SciCalib_ICTTemp#1(epoch10 - Spare)                | ICT Temp 1 - epoch 10 - Spare               | N/A         | N/A                                                    | U         |
| 978       | 14   | 8Sec_SciCalib_ICTTemp#1(epoch10)                        | ICT Temp 1 - epoch 10                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 992       | 2    | 8Sec_SciCalib_ICTTemp#2(epoch10 - Spare)                | ICT Temp 2 - epoch 10 - Spare               | N/A         | N/A                                                    | U         |
| 994       | 14   | 8Sec_SciCalib_ICTTemp#2(epoch10)                        | ICT Temp 2 - epoch 10                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1008      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 10)      | CrTrk Servo Error - sample 21, epoch 10     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1024      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 10)         | InTrk Servo Error - sample 21, epoch 10     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1040      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch11 - Spare)   | IE CCA Cal Resistor Temp - epoch 11 - Spare | N/A         | N/A                                                    | U         |
| 1042      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch11)           | IE CCA Cal Resistor Temp - epoch 11         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1056      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch11 - Spare)    | Low Range Cal Resistor - epoch 11 - Spare   | N/A         | N/A                                                    | U         |
| 1058      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch11)            | Low Range Cal Resistor - epoch 11           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1072      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch11 - Spare)   | High Range Cal Resistor - epoch 11 - Spare  | N/A         | N/A                                                    | U         |
| 1074      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch11)           | High Range Cal Resistor - epoch 11          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1088      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch11 - Spare)                | ICT Temp 1 - epoch 11 - Spare               | N/A         | N/A                                                    | U         |
| 1090      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch11)                        | ICT Temp 1 - epoch 11                       | °C          | -, -, 6.43737E-09, 0.006293816, 22.92502969            | S         |
| 1104      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch11 - Spare)                | ICT Temp 2 - epoch 11 - Spare               | N/A         | N/A                                                    | U         |
| 1106      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch11)                        | ICT Temp 2 - epoch 11                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1120      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 11)      | CrTrk Servo Error - sample 21, epoch 11     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1136      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 11)         | InTrk Servo Error - sample 21, epoch 11     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1152      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch12 - Spare)   | IE CCA Cal Resistor Temp - epoch 12 - Spare | N/A         | N/A                                                    | U         |
| 1154      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch12)           | JE CCA Cal Resistor Temp - epoch 12         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1168      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch12 - Spare)    | Low Range Cal Resistor - epoch 12 - Spare   | N/A         | N/A                                                    | U         |
| 1170      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch12)            | Low Range Cal Resistor - epoch 12           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1184      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch12 - Spare)   | High Range Cal Resistor - epoch 12 - Spare  | N/A         | N/A                                                    | U         |
| 1186      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch12)           | High Range Cal Resistor - epoch 12          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1200      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch12 - Spare)                | ICT Temp 1 - epoch 12 - Spare               | N/A         | N/A                                                    | U         |
| 1202      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch12)                        | ICT Temp 1 - epoch 12                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 1216      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch12 - Spare)                | ICT Temp 2 - epoch 12 - Spare               | N/A         | N/A                                                    | U         |
| 1218      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch12)                        | ICT Temp 2 - epoch 12                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1232      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 12)      | CrTrk Servo Error - sample 21, epoch 12     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1248      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 12)         | InTrk Servo Error - sample 21, epoch 12     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1264      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch13 - Spare)   | IE CCA Cal Resistor Temp - epoch 13 - Spare | N/A         | N/A                                                    | U         |
| 1266      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch13)           | IE CCA Cal Resistor Temp - epoch 13         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1280      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch13 - Spare)    | Low Range Cal Resistor - epoch 13 - Spare   | N/A         | N/A                                                    | U         |
| 1282      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch13)            | Low Range Cal Resistor - epoch 13           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1296      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch13 - Spare)   | High Range Cal Resistor - epoch 13 - Spare  | N/A         | N/A                                                    | U         |
| 1298      | 14   | <pre>Sec_SciCalib_HighRangeCalibResistor(epoch13)</pre> | High Range Cal Resistor - epoch 13          | Ű           | -, -, 0, 0, 0.006324509, 23.615/14/8                   | S         |

| Table 4.2.6 CrIS Science/Calibration Telemet | y Packet User Data Fields ( | (cont) |
|----------------------------------------------|-----------------------------|--------|
|----------------------------------------------|-----------------------------|--------|

|           | Dit         |                                                       |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|-------------|-------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | DIL<br>Sizo | Mnemonic Name                                         | Description                                 | or          | or                                                     | Data Type |
|           | Size        |                                                       |                                             | State Value | State Name                                             |           |
| 1312      | 2           | 8Sec_SciCalib_ICTTemp#1(epoch13 - Spare)              | ICT Temp 1 - epoch 13 - Spare               | N/A         | N/A                                                    | U         |
| 1314      | 14          | 8Sec_SciCalib_ICTTemp#1(epoch13)                      | ICT Temp 1 - epoch 13                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 1328      | 2           | 8Sec_SciCalib_ICTTemp#2(epoch13 - Spare)              | ICT Temp 2 - epoch 13 - Spare               | N/A         | N/A                                                    | U         |
| 1330      | 14          | 8Sec_SciCalib_ICTTemp#2(epoch13)                      | ICT Temp 2 - epoch 13                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1344      | 16          | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 13)    | CrTrk Servo Error - sample 21, epoch 13     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1360      | 16          | 8Sec SciCalib InTrkServoErr(sample 21 epoch 13)       | InTrk Servo Error - sample 21, epoch 13     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1376      | 2           | 8Sec_SciCalib_IECCACalibResistorTemp(epoch14 - Spare) | IE CCA Cal Resistor Temp - epoch 14 - Spare | N/A         | N/A                                                    | U         |
| 1378      | 14          | 8Sec_SciCalib_IECCACalibResistorTemp(epoch14)         | IE CCA Cal Resistor Temp - epoch 14         | <b>0°</b>   | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1392      | 2           | 8Sec_SciCalib_LowRangeCalibResistor(epoch14 - Spare)  | Low Range Cal Resistor - epoch 14 - Spare   | N/A         | N/A                                                    | U         |
| 1394      | 14          | 8Sec_SciCalib_LowRangeCalibResistor(epoch14)          | Low Range Cal Resistor - epoch 14           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1408      | 2           | 8Sec_SciCalib_HighRangeCalibResistor(epoch14 - Spare) | High Range Cal Resistor - epoch 14 - Spare  | N/A         | N/A                                                    | U         |
| 1410      | 14          | 8Sec SciCalib HighRangeCalibResistor(epoch14)         | High Range Cal Resistor - epoch 14          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1424      | 2           | 8Sec_SciCalib_ICTTemp#1(epoch14 - Spare)              | ICT Temp 1 - epoch 14 - Spare               | N/A         | N/A                                                    | U         |
| 1426      | 14          | 8Sec SciCalib ICTTemp#1(epoch14)                      | ICT Temp 1 - epoch 14                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 1440      | 2           | 8Sec SciCalib ICTTemp#2(epoch14 - Spare)              | ICT Temp 2 - epoch 14 - Spare               | N/A         | N/A                                                    | U         |
| 1442      | 14          | 8Sec SciCalib ICTTemp#2(epoch14)                      | ICT Temp 2 - epoch 14                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1456      | 16          | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 14)    | CrTrk Servo Error - sample 21, epoch 14     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1472      | 16          | 8Sec SciCalib InTrkServoErr(sample 21 epoch 14)       | InTrk Servo Error - sample 21, epoch 14     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1488      | 2           | 8Sec SciCalib IECCACalibResistorTemp(epoch15 - Spare) | IE CCA Cal Resistor Temp - epoch 15 - Spare | N/A         | N/A                                                    | U         |
| 1490      | 14          | 8Sec SciCalib IECCACalibResistorTemp(epoch15)         | IE CCA Cal Resistor Temp - epoch 15         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1504      | 2           | 8Sec SciCalib LowRangeCalibResistor(epoch15 - Spare)  | Low Range Cal Resistor - epoch 15 - Spare   | N/A         | N/A                                                    | U         |
| 1506      | 14          | 8Sec SciCalib LowRangeCalibResistor(epoch15)          | Low Range Cal Resistor - epoch 15           | °C          | 0. 0. 0.006324509. 23.61571478                         | S         |
| 1520      | 2           | 8Sec SciCalib HighRangeCalibResistor(epoch15 - Spare) | High Range Cal Resistor - epoch 15 - Spare  | N/A         | N/A                                                    | U         |
| 1522      | 14          | 8Sec SciCalib HighRangeCalibResistor(epoch15)         | High Range Cal Resistor - epoch 15          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1536      | 2           | 8Sec SciCalib ICTTemp#1(epoch15 - Spare)              | ICT Temp 1 - epoch 15 - Spare               | N/A         | N/A                                                    | U         |
| 1538      | 14          | 8Sec SciCalib ICTTemp#1(epoch15)                      | ICT Temp 1 - epoch 15                       | °C          | 6.43737E-09. 0.006293816. 22.92502969                  | S         |
| 1552      | 2           | 8Sec SciCalib ICTTemp#2(epoch15 - Spare)              | ICT Temp 2 - epoch 15 - Spare               | N/A         | N/A                                                    | U         |
| 1554      | 14          | 8Sec SciCalib ICTTemp#2(epoch15)                      | ICT Temp 2 - epoch 15                       | °C          | , -, 6.05758E-09, 0.006313351, 23.5785997              | S         |
| 1568      | 16          | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 15)    | CrTrk Servo Error - sample 21, epoch 15     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1584      | 16          | 8Sec SciCalib InTrkServoErr(sample 21 epoch 15)       | InTrk Servo Error - sample 21, epoch 15     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1600      | 2           | 8Sec SciCalib IECCACalibResistorTemp(epoch16 - Spare) | IE CCA Cal Resistor Temp - epoch 16 - Spare | N/A         | N/A                                                    | U         |
| 1602      | 14          | 8Sec SciCalib IECCACalibResistorTemp(epoch16)         | IE CCA Cal Resistor Temp - epoch 16         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1616      | 2           | 8Sec SciCalib LowRangeCalibResistor(epoch16 - Spare)  | Low Range Cal Resistor - epoch 16 - Spare   | N/A         | N/A                                                    | U         |
| 1618      | 14          | 8Sec SciCalib LowRangeCalibResistor(epoch16)          | Low Range Cal Resistor - epoch 16           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1632      | 2           | 8Sec SciCalib HighRangeCalibResistor(epoch16 - Spare) | High Range Cal Resistor - epoch 16 - Spare  | N/A         | N/A                                                    | U         |
| 1634      | 14          | 8Sec SciCalib HighRangeCalibResistor(epoch16)         | High Range Cal Resistor - epoch 16          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1648      | 2           | 8Sec SciCalib ICTTemp#1(epoch16 - Spare)              | ICT Temp 1 - epoch 16 - Spare               | N/A         | N/A                                                    | U         |
| 1650      | 14          | 8Sec SciCalib ICTTemp#1(epoch16)                      | ICT Temp 1 - epoch 16                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 1664      | 2           | 8Sec SciCalib ICTTemp#2(epoch16 - Spare)              | ICT Temp 2 - epoch 16 - Spare               | N/A         | N/A                                                    | U         |
| 1666      | 14          | 8Sec SciCalib ICTTemp#2(epoch16)                      | ICT Temp 2 - epoch 16                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1680      | 16          | 8Sec SciCalib InTrkServoErr(sample 21 epoch 16)       | InTrk Servo Error - sample 21, epoch 16     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1696      | 16          | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 16)    | CrTrk Servo Error - sample 21, epoch 16     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1712      | 2           | 8Sec_SciCalib_IECCACalibResistorTemp(epoch17 - Spare) | IE CCA Cal Resistor Temp - epoch 17 - Spare | N/A         | N/A                                                    | U         |
| 1714      | 14          | 8Sec SciCalib IECCACalibResistorTemp(epoch17)         | IE CCA Cal Resistor Temp - epoch 17         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1728      | 2           | 8Sec SciCalib LowRangeCalibResistor(epoch17 - Spare)  | Low Range Cal Resistor - epoch 17 - Spare   | N/A         | N/A                                                    | U         |
| 1730      | 14          | 8Sec SciCalib LowRangeCalibResistor(epoch17)          | Low Range Cal Resistor - epoch 17           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1744      | 2           | 8Sec SciCalib HighRangeCalibResistor(epoch17 - Spare) | High Range Cal Resistor - epoch 17 - Spare  | N/A         | N/A                                                    | U         |
| 1746      | 14          | 8Sec_SciCalib_HighRangeCalibResistor(epoch17)         | High Řange Cal Resistor - epoch 17          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
|           |             |                                                       |                                             |             |                                                        |           |
|           |             |                                                       |                                             |             |                                                        |           |

|           | Rit      |                                                          |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|----------|----------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Size     | Mnemonic Name                                            | Description                                 | or          | or                                                     | Data Type |
|           | 0.20     |                                                          |                                             | State Value | State Name                                             |           |
| 1760      | 2        | 8Sec_SciCalib_ICTTemp#1(epoch17 - Spare)                 | ICT Temp 1 - epoch 17 - Spare               | N/A         | N/A                                                    | U         |
| 1762      | 14       | 8Sec_SciCalib_ICTTemp#1(epoch17)                         | ICT Temp 1 - epoch 17                       | 0°          | -, -, 6.43737E-09, 0.006293816, 22.92502969            | S         |
| 1776      | 2        | 8Sec_SciCalib_ICTTemp#2(epoch17 - Spare)                 | ICT Temp 2 - epoch 17 - Spare               | N/A         | N/A                                                    | U         |
| 1778      | 14       | 8Sec_SciCalib_ICTTemp#2(epoch17)                         | ICT Temp 2 - epoch 17                       | ≥ O°        | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 1792      | 16       | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 17)       | CrTrk Servo Error - sample 21, epoch 17     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 1808      | 16       | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 17)          | InTrk Servo Error - sample 21, epoch 17     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 1824      | 2        | 8Sec_SciCalib_IECCACalibResistorTemp(epoch18 - Spare)    | IE CCA Cal Resistor Temp - epoch 18 - Spare | N/A         | N/A                                                    | U         |
| 1826      | 14       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch18)            | IE CCA Cal Resistor Temp - epoch 18         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1840      | 2        | 8Sec_SciCalib_LowRangeCalibResistor(epoch18 - Spare)     | Low Range Cal Resistor - epoch 18 - Spare   | N/A         | N/A                                                    | U         |
| 1842      | 14       | 8Sec_SciCalib_LowRangeCalibResistor(epoch18)             | Low Range Cal Resistor - epoch 18           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1856      | 2        | 8Sec_SciCalib_HighRangeCalibResistor(epoch18 - Spare)    | High Range Cal Resistor - epoch 18 - Spare  | N/A         | N/A                                                    | U         |
| 1858      | 14       | 8Sec_SciCalib_HighRangeCalibResistor(epoch18)            | High Range Cal Resistor - epoch 18          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 1872      | 2        | 8Sec SciCalib ICTTemp#1(epoch18 - Spare)                 | ICT Temp 1 - epoch 18 - Spare               | N/A         | N/A                                                    | U         |
| 1874      | 14       | 8Sec SciCalib ICTTemp#1(epoch18)                         | ICT Temp 1 - epoch 18                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 1888      | 2        | 8Sec SciCalib ICTTemp#2(epoch18 - Spare)                 | ICT Temp 2 - epoch 18 - Spare               | N/A         | N/A                                                    | U         |
| 1890      | 14       | 8Sec SciCalib ICTTemp#2(epoch18)                         | ICT Temp 2 - epoch 18                       | °C          | 6.05758E-09. 0.006313351. 23.5785997                   | S         |
| 1904      | 16       | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 18)       | CrTrk Servo Error - sample 21, epoch 18     | N/A         | 0, 0, 2,996, 0                                         | S         |
| 1920      | 16       | 8Sec SciCalib InTrkServoErr(sample 21 epoch 18)          | InTrk Servo Error - sample 21, epoch 18     | N/A         | 0. 0. 0.5645. 0                                        | S         |
| 1936      | 2        | 8Sec SciCalib IECCACalibResistorTemp(epoch19 - Spare)    | IE CCA Cal Resistor Temp - epoch 19 - Spare | N/A         | N/A                                                    | Ū         |
| 1938      | 14       | 8Sec SciCalib IECCACalibResistorTemp(epoch19)            | IF CCA Cal Resistor Temp - epoch 19         | °C          | 0 0 0 006324509 23 61571478                            | S         |
| 1952      | 2        | 8Sec. SciCalib LowBangeCalibResistor(enoch19 - Spare)    | Low Range Cal Resistor - enoch 19 - Spare   | N/A         | N/A                                                    | 1 ŭ       |
| 1954      | 14       | 8Sec. SciCalib LowRangeCalibResistor(epoch19)            | Low Range Cal Resistor - epoch 19           | <u>.</u>    | 0 0 0 006324509 23 61571478                            | s         |
| 1968      | 2        | 8Sec. SciCalib, HighRangeCalibResistor(enoch19 - Spare)  | High Range Cal Resistor - enoch 19 - Spare  | N/A         | N/A                                                    | - ŭ       |
| 1970      | 14       | 8Sec. SciCalib, HighRangeCalibResistor(epoch19)          | High Range Cal Resistor - enoch 19          | °C          | 0 0 0 006324509 23 61571478                            | s         |
| 1984      | 2        | 8Sec. SciCalib ICTTemp#1(enoch19 - Snare)                | ICT Temp 1 - enoch 19 - Spare               | N/A         | Ν/Δ                                                    | Ť         |
| 1986      | 14       | 8Sec. SciCalib ICTTemp#1(epoch19)                        | ICT Temp 1 - enoch 19                       | °C          | 6.43737E-09.0.006293816.22.92502969                    | ŝ         |
| 2000      | 2        | 8Sec. SciCalib ICTTemp#2(enoch19 - Spare)                | ICT Temp 2 - enoch 19 - Spare               | N/A         | Ν/Δ                                                    | - ŭ       |
| 2000      | 14       | 8Sec. SciCalib_ICTTemp#2(epoch19)                        | ICT Temp 2 - epoch 19                       | °C          | 6 05758E-09 0 006313351 23 5785997                     | s         |
| 2016      | 14       | 8Sec. SciCalib, CrossTrkServoErr(sample 21 epoch 19)     | CrTrk Servo Error - sample 21 enoch 19      | N/A         | , , , , 0.001002 00, 0.00001, 20.0100001               | s         |
| 2010      | 16       | 8Sec. SciCalib. InTrkServoErr(sample 21 epoch 19)        | InTrk Serve Error - sample 21, epoch 19     | N/A         | 0 0 0 5645 0                                           |           |
| 2032      | 2        | 8Sec. SciCalib_IECCACalibResistorTemp(enoch20 - Spare)   | IF CCA Cal Resistor Temp - enoch 20 - Spare | N/A         | _, _, 0, 0, 0.0040, 0<br>Ν/Δ                           | - ŭ       |
| 2050      | 1/       | 8Sec. SciCalib IECCACalibResistorTemp(epoch20 - Oparc)   | IE CCA Cal Resistor Temp - epoch 20         | °C          |                                                        |           |
| 2000      | 2        | 8Sec. SciCalib LowBangeCalibResister(enoch20 - Spare)    | Low Range Cal Resistor - enoch 20 - Spare   | N/A         | Ν/Δ                                                    | <u> </u>  |
| 2066      | 14       | 8Sec. SciCalib LowRangeCalibResistor(epoch20 - Opare)    | Low Range Cal Resistor - epoch 20           | °C          | 0 0 006324509 23 61571478                              | Š         |
| 2000      | 2        | 8Sec. SciCalib, HighBangeCalibResistor(epoch20) - Spare) | High Range Cal Register - enoch 20 - Share  | N/A         | -, -, 0, 0, 0.000324000, 20.01071470                   | - ĭ       |
| 2000      | 1/       | 8Sec. SciCalib_HighRangeCalibResistor(epoch20 - Spare)   | High Range Cal Resistor - epoch 20          | ۱۱۷/۸<br>°C |                                                        | <br>      |
| 2002      | 2        | 8Sec. SciCalib_Ingintangeoalibitesistor(epocitzo)        |                                             | N/A         | -, -, 0, 0, 0.000324303, 23.01371470                   |           |
| 2000      | 1/       | 8Sec. SciCalib ICTTemp#1(epoch20)                        | ICT Temp 1 - epoch 20                       | 110/A       | 6 43737E 00 0 006203816 22 02502060                    | - °       |
| 2030      | 2        | 8Sec_SciCalib_ICTTemp#2(enoch20 - Spare)                 | ICT Temp 2 - enoch 20 - Spare               | N/A         | -, -, -, 0.43737L-03, 0.000233010, 22.32302303         |           |
| 2112      | 14       | 8Soc SciCalib ICTTomp#2(epoch20)                         | ICT Tomp 2 - opech 20                       | N⊮A<br>°C   | 6 05759E 00 0 006212251 22 5795007                     |           |
| 2114      | 14       | 8Soc SciCalib CrossTrkSon(Serr/sample 21 opech 20)       | CrTrk Sono Error, sample 21 openh 20        | N/A         |                                                        |           |
| 2120      | 16       | 8Sec. SciCalib. InTrkServeErr/sample 21 epoch 20)        | InTrk Serve Error - sample 21, epoch 20     | N/A         | ,, 0, 0, 2.330, 0                                      | ~ ~       |
| 2144      | 2        | 8Sec_SciCalib_IECCACalibBesisterTemp(epoch21_Spars)      | IF CCA Cal Register Temp - anoch 21 - Spare | N/A         | -, -, υ, υ, υ.3040, υ<br>ΝΙ/Δ                          |           |
| 2160      | ∠<br>1/  | 8Sec. SciCalib_IECCACalibResistorTemp(epoch21)           | IE OUA Gal Resistor Temp - epoch 21         | N/A<br>℃    |                                                        |           |
| 2102      | 14       | 8Soc. SciCalib LowPangoCalibResistor(anach21 Spara)      | Low Parao Cal Posister - apoch 21 - Spara   | N/A         | -, -, 0, 0, 0.000024000, 20.01071470                   |           |
| 21/0      |          | 8Sec. SciCalib LowPangeCalibResistor(apoch21)            | Low Trange Cal Resistor - epoch 21          | N/A<br>℃    |                                                        |           |
| 21/0      | 14       | 8Sec_SciCalib_HighBangeCalibResistor(epoch21_Space)      | LUW Rahye Gal Resistor - epoch 21 - Spare   | N/A         | -, -, 0, 0, 0.000324303, 23.01371470<br>N/A            |           |
| 2192      | _∠<br>14 | 8Sec. SciCalib, HighRangeCalibResistor(epoch21)          | High Range Cal Resistor - epoch 21          | °C          | 0 0 0 006324509 23 61571478                            | - S       |
| 2104      |          | ooco_ooloanb_rngnitangeoanbitesistoi(ep00121)            | riigii Mange Gai Mesistoi - epoon 2 i       |             | -, -, 0, 0, 0.000024000, 20.01071470                   | U U       |
|           |          |                                                          |                                             |             |                                                        |           |

|           | Rit  |                                                       |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|-------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name                                         | Description                                 | or          | or                                                     | Data Type |
|           | 0120 |                                                       |                                             | State Value | State Name                                             |           |
| 2208      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch21 - Spare)              | ICT Temp 1 - epoch 21 - Spare               | N/A         | N/A                                                    | U         |
| 2210      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch21)                      | ICT Temp 1 - epoch 21                       | °C          | 👞 🥄 -, -, 6.43737E-09, 0.006293816, 22.92502969        | S         |
| 2224      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch21 - Spare)              | ICT Temp 2 - epoch 21 - Spare               | N/A         | N/A                                                    | U         |
| 2226      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch21)                      | ICT Temp 2 - epoch 21                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2240      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 21)    | CrTrk Servo Error - sample 21, epoch 21     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2256      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 21)       | InTrk Servo Error - sample 21, epoch 21     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2272      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch22 - Spare) | IE CCA Cal Resistor Temp - epoch 22 - Spare | N/A         | N/A                                                    | U         |
| 2274      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch22)         | IE CCA Cal Resistor Temp - epoch 22         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2288      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch22 - Spare)  | Low Range Cal Resistor - epoch 22 - Spare   | N/A         | N/A                                                    | U         |
| 2290      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch22)          | Low Range Cal Resistor - epoch 22           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2304      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch22 - Spare) | High Range Cal Resistor - epoch 22 - Spare  | N/A         | N/A                                                    | U         |
| 2306      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch22)         | High Range Cal Resistor - epoch 22          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2320      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch22 - Spare)              | ICT Temp 1 - epoch 22 - Spare               | N/A         | N/A                                                    | U         |
| 2322      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch22)                      | ICT Temp 1 - epoch 22                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 2336      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch22 - Spare)              | ICT Temp 2 - epoch 22 - Spare               | N/A         | N/A                                                    | U         |
| 2338      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch22)                      | ICT Temp 2 - epoch 22                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2352      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 22)    | CrTrk Servo Error - sample 21, epoch 22     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2368      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 22)       | InTrk Servo Error - sample 21, epoch 22     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2384      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch23 - Spare) | IE CCA Cal Resistor Temp - epoch 23 - Spare | N/A         | N/A                                                    | U         |
| 2386      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch23)         | IE CCA Cal Resistor Temp - epoch 23         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2400      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch23 - Spare)  | Low Range Cal Resistor - epoch 23 - Spare   | N/A         | N/A                                                    | U         |
| 2402      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch23)          | Low Range Cal Resistor - epoch 23           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2416      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch23 - Spare) | High Range Cal Resistor - epoch 23 - Spare  | N/A         | N/A                                                    | U         |
| 2418      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch23)         | High Range Cal Resistor - epoch 23          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2432      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch23 - Spare)              | ICT Temp 1 - epoch 23 - Spare               | N/A         | N/A                                                    | U         |
| 2434      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch23)                      | ICT Temp 1 - epoch 23                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 2448      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch23 - Spare)              | ICT Temp 2 - epoch 23 - Spare               | N/A         | N/A                                                    | U         |
| 2450      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch23)                      | ICT Temp 2 - epoch 23                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2464      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 23)    | CrTrk Servo Error - sample 21, epoch 23     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2480      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 23)       | InTrk Servo Error - sample 21, epoch 23     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2496      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch24 - Spare) | IE CCA Cal Resistor Temp - epoch 24 - Spare | N/A         | N/A                                                    | U         |
| 2498      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch24)         | IE CCA Cal Resistor Temp - epoch 24         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2512      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch24 - Spare)  | Low Range Cal Resistor - epoch 24 - Spare   | N/A         | N/A                                                    | U         |
| 2514      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch24)          | Low Range Cal Resistor - epoch 24           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2528      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch24 - Spare) | High Range Cal Resistor - epoch 24 - Spare  | N/A         | N/A                                                    | U         |
| 2530      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch24)         | High Range Cal Resistor - epoch 24          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2544      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch24 - Spare)              | ICT Temp 1 - epoch 24 - Spare               | N/A         | N/A                                                    | U         |
| 2546      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch24)                      | ICT Temp 1 - epoch 24                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 2560      | 2    | 8Sec SciCalib ICTTemp#2(epoch24 - Spare)              | ICT Temp 2 - epoch 24 - Spare               | N/A         | N/A                                                    | U         |
| 2562      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch24)                      | ICT Temp 2 - epoch 24                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2576      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 24)    | CrTrk Servo Error - sample 21, epoch 24     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2592      | 16   | 8Sec SciCalib InTrkServoErr(sample 21 epoch 24)       | InTrk Servo Error - sample 21, epoch 24     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2608      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch25 - Spare) | IE CCA Cal Resistor Temp - epoch 25 - Spare | N/A         | N/A                                                    | U         |
| 2610      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch25)         | IE CCA Cal Resistor Temp - epoch 25         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2624      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch25 - Spare)  | Low Range Cal Resistor - epoch 25 - Spare   | N/A         | N/A                                                    | U         |
| 2626      | 14   | 8Sec SciCalib LowRangeCalibResistor(epoch25)          | Low Range Cal Resistor - epoch 25           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2640      | 2    | 8Sec SciCalib HighRangeCalibResistor(epoch25 - Spare) | High Range Cal Resistor - epoch 25 - Spare  | N/A         | N/A                                                    | U         |
| 2642      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch25)         | High Řange Cal Resistor - epoch 25          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
|           |      |                                                       |                                             | -           |                                                        | -         |

|           | Rit. |                                                       |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|-------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name                                         | Description                                 | or          | or                                                     | Data Type |
|           |      |                                                       |                                             | State Value | State Name                                             |           |
| 2656      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch25 - Spare)              | ICT Temp 1 - epoch 25 - Spare               | N/A         | N/A                                                    | U         |
| 2658      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch25)                      | ICT Temp 1 - epoch 25                       | °C          | -, -, 6.43737E-09, 0.006293816, 22.92502969            | S         |
| 2672      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch25 - Spare)              | ICT Temp 2 - epoch 25 - Spare               | N/A         | N/A                                                    | U         |
| 2674      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch25)                      | ICT Temp 2 - epoch 25                       | °C 🔺        | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2688      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 25)    | CrTrk Servo Error - sample 21, epoch 25     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2704      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 25)       | InTrk Servo Error - sample 21, epoch 25     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2720      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch26 - Spare) | IE CCA Cal Resistor Temp - epoch 26 - Spare | N/A         | N/A                                                    | U         |
| 2722      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch26)         | IE CCA Cal Resistor Temp - epoch 26         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2736      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch26 - Spare)  | Low Range Cal Resistor - epoch 26 - Spare   | N/A         | N/A                                                    | U         |
| 2738      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch26)          | Low Range Cal Resistor - epoch 26           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2752      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch26 - Spare) | High Range Cal Resistor - epoch 26 - Spare  | N/A         | N/A                                                    | U         |
| 2754      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch26)         | High Range Cal Resistor - epoch 26          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2768      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch26 - Spare)              | ICT Temp 1 - epoch 26 - Spare               | N/A         | N/A                                                    | U         |
| 2770      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch26)                      | ICT Temp 1 - epoch 26                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 2784      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch26 - Spare)              | ICT Temp 2 - epoch 26 - Spare               | N/A         | N/A                                                    | U         |
| 2786      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch26)                      | ICT Temp 2 - epoch 26                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2800      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 26)    | CrTrk Servo Error - sample 21, epoch 26     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2816      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 26)       | InTrk Servo Error - sample 21, epoch 26     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2832      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch27 - Spare) | IE CCA Cal Resistor Temp - epoch 27 - Spare | N/A         | N/A                                                    | U         |
| 2834      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch27)         | IE CCA Cal Resistor Temp - epoch 27         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2848      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch27 - Spare)  | Low Range Cal Resistor - epoch 27 - Spare   | N/A         | N/A                                                    | U         |
| 2850      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch27)          | Low Range Cal Resistor - epoch 27           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2864      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch27 - Spare) | High Range Cal Resistor - epoch 27 - Spare  | N/A         | N/A                                                    | U         |
| 2866      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch27)         | High Range Cal Resistor - epoch 27          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2880      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch27 - Spare)              | ICT Temp 1 - epoch 27 - Spare               | N/A         | N/A                                                    | U         |
| 2882      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch27)                      | ICT Temp 1 - epoch 27                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 2896      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch27 - Spare)              | ICT Temp 2 - epoch 27 - Spare               | N/A         | N/A                                                    | U         |
| 2898      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch27)                      | ICT Temp 2 - epoch 27                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 2912      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 27)    | CrTrk Servo Error - sample 21, epoch 27     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 2928      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 27)       | InTrk Servo Error - sample 21, epoch 27     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 2944      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch28 - Spare) | IE CCA Cal Resistor Temp - epoch 28 - Spare | N/A         | N/A                                                    | U         |
| 2946      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch28)         | IE CCA Cal Resistor Temp - epoch 28         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2960      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch28 - Spare)  | Low Range Cal Resistor - epoch 28 - Spare   | N/A         | N/A                                                    | U         |
| 2962      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch28)          | Low Range Cal Resistor - epoch 28           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2976      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch28 - Spare) | High Range Cal Resistor - epoch 28 - Spare  | N/A         | N/A                                                    | U         |
| 2978      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch28)         | High Range Cal Resistor - epoch 28          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 2992      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch28 - Spare)              | ICT Temp 1 - epoch 28 - Spare               | N/A         | N/A                                                    | U         |
| 2994      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch28)                      | ICT Temp 1 - epoch 28                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S         |
| 3008      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch28 - Spare)              | ICT Temp 2 - epoch 28 - Spare               | N/A         | N/A                                                    | U         |
| 3010      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch28)                      | ICT Temp 2 - epoch 28                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S         |
| 3024      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 28)    | CrTrk Servo Error - sample 21, epoch 28     | N/A         | -, -, 0, 0, 2.996, 0                                   | S         |
| 3040      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 28)       | In Trk Servo Error - sample 21, epoch 28    | N/A         | -, -, 0, 0, 0.5645, 0                                  | S         |
| 3056      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch29 - Spare) | IE CCA Cal Resistor Temp - epoch 29 - Spare | N/A         | N/A                                                    | U         |
| 3058      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch29)         | IE CCA Cal Resistor Temp - epoch 29         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 3072      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch29 - Spare)  | Low Range Cal Resistor - epoch 29 - Spare   | N/A         | N/A                                                    | U         |
| 3074      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch29)          | Low Range Cal Resistor - epoch 29           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S         |
| 3088      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch29 - Spare) | High Range Cal Resistor - epoch 29 - Spare  | N/A         | N/A                                                    | U         |
| 3090      | 14   | 85ec_5ciCalib_HighRangeCalibResistor(epoch29)         | Hign Kange Gai Kesistor - epoch 29          | Ű           | -, -, 0, 0, 0.006324509, 23.61571478                   | 5         |

|           | Bit  |                                                       |                                             | Units Conversion Coefficients (formula or C5,C4,C3,C2,C |                                                |           |
|-----------|------|-------------------------------------------------------|---------------------------------------------|---------------------------------------------------------|------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name                                         | Description                                 | or                                                      | or                                             | Data Type |
|           | OILO |                                                       |                                             | State Value                                             | State Name                                     |           |
| 3104      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch29 - Spare)              | ICT Temp 1 - epoch 29 - Spare               | N/A                                                     | N/A                                            | U         |
| 3106      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch29)                      | ICT Temp 1 - epoch 29                       | °C                                                      | -, -, 6.43737E-09, 0.006293816, 22.92502969    | S         |
| 3120      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch29 - Spare)              | ICT Temp 2 - epoch 29 - Spare               | N/A                                                     | N/A                                            | U         |
| 3122      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch29)                      | ICT Temp 2 - epoch 29                       | °C                                                      | -, -, -, 6.05758E-09, 0.006313351, 23.5785997  | S         |
| 3136      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 29)    | CrTrk Servo Error - sample 21, epoch 29     | N/A                                                     | -, -, 0, 0, 2.996, 0                           | S         |
| 3152      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 29)       | InTrk Servo Error - sample 21, epoch 29     | N/A                                                     | -, -, 0, 0, 0.5645, 0                          | S         |
| 3168      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch30 - Spare) | IE CCA Cal Resistor Temp - epoch 30 - Spare | N/A                                                     | N/A                                            | U         |
| 3170      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch30)         | IE CCA Cal Resistor Temp - epoch 30         | 0°                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3184      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch30 - Spare)  | Low Range Cal Resistor - epoch 30 - Spare   | N/A                                                     | N/A                                            | U         |
| 3186      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch30)          | Low Range Cal Resistor - epoch 30           | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3200      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch30 - Spare) | High Range Cal Resistor - epoch 30 - Spare  | N/A                                                     | N/A                                            | U         |
| 3202      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch30)         | High Range Cal Resistor - epoch 30          | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3216      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch30 - Spare)              | ICT Temp 1 - epoch 30 - Spare               | N/A                                                     | N/A                                            | U         |
| 3218      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch30)                      | ICT Temp 1 - epoch 30                       | °C                                                      | -, -, -, 6.43737E-09, 0.006293816, 22.92502969 | S         |
| 3232      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch30 - Spare)              | ICT Temp 2 - epoch 30 - Spare               | N/A                                                     | N/A                                            | U         |
| 3234      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch30)                      | ICT Temp 2 - epoch 30                       | °C                                                      | -, -, -, 6.05758E-09, 0.006313351, 23.5785997  | S         |
| 3248      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 30)    | CrTrk Servo Error - sample 21, epoch 30     | N/A                                                     | -, -, 0, 0, 2.996, 0                           | S         |
| 3264      | 16   | 8Sec SciCalib InTrkServoErr(sample 21 epoch 30)       | InTrk Servo Error - sample 21, epoch 30     | N/A                                                     | -, -, 0, 0, 0.5645, 0                          | S         |
| 3280      | 2    | 8Sec SciCalib IECCACalibResistorTemp(epoch31 - Spare) | IE CCA Cal Resistor Temp - epoch 31 - Spare | N/A                                                     | N/A                                            | U         |
| 3282      | 14   | 8Sec SciCalib IECCACalibResistorTemp(epoch31)         | IE CCA Cal Resistor Temp - epoch 31         | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3296      | 2    | 8Sec SciCalib LowRangeCalibResistor(epoch31 - Spare)  | Low Range Cal Resistor - epoch 31 - Spare   | N/A                                                     | N/A                                            | U         |
| 3298      | 14   | 8Sec SciCalib LowRangeCalibResistor(epoch31)          | Low Range Cal Resistor - epoch 31           | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3312      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch31 - Spare) | High Range Cal Resistor - epoch 31 - Spare  | N/A                                                     | N/A                                            | U         |
| 3314      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch31)         | High Range Cal Resistor - epoch 31          | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3328      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch31 - Spare)              | ICT Temp 1 - epoch 31 - Spare               | N/A                                                     | N/A                                            | U         |
| 3330      | 14   | 8Sec SciCalib ICTTemp#1(epoch31)                      | ICT Temp 1 - epoch 31                       | °C                                                      | -, -, -, 6.43737E-09, 0.006293816, 22.92502969 | S         |
| 3344      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch31 - Spare)              | ICT Temp 2 - epoch 31 - Spare               | N/A                                                     | N/A                                            | U         |
| 3346      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch31)                      | ICT Temp 2 - epoch 31                       | °C                                                      | -, -, -, 6.05758E-09, 0.006313351, 23.5785997  | S         |
| 3360      | 16   | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 31)    | CrTrk Servo Error - sample 21, epoch 31     | N/A                                                     | -, -, 0, 0, 2.996, 0                           | S         |
| 3376      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 31)       | InTrk Servo Error - sample 21, epoch 31     | N/A                                                     | -, -, 0, 0, 0.5645, 0                          | S         |
| 3392      | 2    | 8Sec SciCalib IECCACalibResistorTemp(epoch32 - Spare) | IE CCA Cal Resistor Temp - epoch 32 - Spare | N/A                                                     | N/A                                            | U         |
| 3394      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch32)         | IE CCA Cal Resistor Temp - epoch 32         | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3408      | 2    | 8Sec SciCalib LowRangeCalibResistor(epoch32 - Spare)  | Low Range Cal Resistor - epoch 32 - Spare   | N/A                                                     | N/A                                            | U         |
| 3410      | 14   | 8Sec SciCalib LowRangeCalibResistor(epoch32)          | Low Range Cal Resistor - epoch 32           | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3424      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch32 - Spare) | High Range Cal Resistor - epoch 32 - Spare  | N/A                                                     | N/A                                            | U         |
| 3426      | 14   | 8Sec SciCalib HighRangeCalibResistor(epoch32)         | High Range Cal Resistor - epoch 32          | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3440      | 2    | 8Sec SciCalib ICTTemp#1(epoch32 - Spare)              | ICT Temp 1 - epoch 32 - Spare               | N/A                                                     | N/A                                            | U         |
| 3442      | 14   | 8Sec SciCalib ICTTemp#1(epoch32)                      | ICT Temp 1 - epoch 32                       | °C                                                      | -, -, 6.43737E-09, 0.006293816, 22.92502969    | S         |
| 3456      | 2    | 8Sec SciCalib ICTTemp#2(epoch32 - Spare)              | ICT Temp 2 - epoch 32 - Spare               | N/A                                                     | N/A                                            | U         |
| 3458      | 14   | 8Sec SciCalib ICTTemp#2(epoch32)                      | ICT Temp 2 - epoch 32                       | °C                                                      | -, -, -, 6.05758E-09, 0.006313351, 23.5785997  | S         |
| 3472      | 16   | 8Sec SciCalib CrossTrkServoErr(sample 21 epoch 32)    | CrTrk Servo Error - sample 21, epoch 32     | N/A                                                     | -, -, 0, 0, 2,996, 0                           | S         |
| 3488      | 16   | 8Sec SciCalib InTrkServoErr(sample 21 epoch 32)       | In Trk Servo Error - sample 21, epoch 32    | N/A                                                     | -, -, 0, 0, 0, 5645, 0                         | S         |
| 3504      | 2    | 8Sec SciCalib IECCACalibResistorTemp(epoch33 - Spare) | IE CCA Cal Resistor Temp - epoch 33 - Spare | N/A                                                     | N/A                                            | U         |
| 3506      | 14   | 8Sec SciCalib IECCACalibResistorTemp(epoch33)         | IE CCA Cal Resistor Temp - epoch 33         | °C                                                      | 0. 0. 0.006324509. 23.61571478                 | S         |
| 3520      | 2    | 8Sec SciCalib LowRangeCalibResistor(epoch33 - Spare)  | Low Range Cal Resistor - epoch 33 - Spare   | N/A                                                     | N/A                                            | Ū         |
| 3522      | 14   | 8Sec SciCalib LowRangeCalibResistor(epoch33)          | Low Range Cal Resistor - epoch 33           | °C                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
| 3536      | 2    | 8Sec SciCalib HighRangeCalibResistor(epoch33 - Spare) | High Range Cal Resistor - epoch 33 - Spare  | N/A                                                     | N/A                                            | Ū         |
| 3538      | 14   | 8Sec_SciCalib_HighKangeCalibResistor(epoch33)         | High Range Cal Resistor - epoch 33          | 0°                                                      | -, -, 0, 0, 0.006324509, 23.61571478           | S         |
|           |      |                                                       |                                             |                                                         |                                                |           |

|           | Bit  |                                                         |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |                |
|-----------|------|---------------------------------------------------------|---------------------------------------------|-------------|--------------------------------------------------------|----------------|
| Start Bit | Size | Mnemonic Name                                           | Description                                 | or          | or                                                     | Data Type      |
|           | OILO |                                                         |                                             | State Value | State Name                                             |                |
| 3552      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch33 - Spare)                | ICT Temp 1 - epoch 33 - Spare               | N/A         | N/A                                                    | U              |
| 3554      | 14   | 8Sec_SciCalib_ICTTemp#1(epoch33)                        | ICT Temp 1 - epoch 33                       | °C          | -, -, 6.43737E-09, 0.006293816, 22.92502969            | S              |
| 3568      | 2    | 8Sec_SciCalib_ICTTemp#2(epoch33 - Spare)                | ICT Temp 2 - epoch 33 - Spare               | N/A         | N/A                                                    | U              |
| 3570      | 14   | 8Sec_SciCalib_ICTTemp#2(epoch33)                        | ICT Temp 2 - epoch 33                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997          | S              |
| 3584      | 16   | 8Sec_SciCalib_CrossTrkServoErr(sample 21 epoch 33)      | CrTrk Servo Error - sample 21, epoch 33     | N/A         | -, -, 0, 0, 2.996, 0                                   | S              |
| 3600      | 16   | 8Sec_SciCalib_InTrkServoErr(sample 21 epoch 33)         | InTrk Servo Error - sample 21, epoch 33     | N/A         | -, -, 0, 0, 0.5645, 0                                  | S              |
| 3616      | 2    | 8Sec_SciCalib_IECCACalibResistorTemp(epoch34 - Spare)   | IE CCA Cal Resistor Temp - epoch 34 - Spare | N/A         | N/A                                                    | U              |
| 3618      | 14   | 8Sec_SciCalib_IECCACalibResistorTemp(epoch34)           | IE CCA Cal Resistor Temp - epoch 34         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S              |
| 3632      | 2    | 8Sec_SciCalib_LowRangeCalibResistor(epoch34 - Spare)    | Low Range Cal Resistor - epoch 34 - Spare   | N/A         | N/A                                                    | U              |
| 3634      | 14   | 8Sec_SciCalib_LowRangeCalibResistor(epoch34)            | Low Range Cal Resistor - epoch 34           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S              |
| 3648      | 2    | 8Sec_SciCalib_HighRangeCalibResistor(epoch34 - Spare)   | High Range Cal Resistor - epoch 34 - Spare  | N/A         | N/A                                                    | U              |
| 3650      | 14   | 8Sec_SciCalib_HighRangeCalibResistor(epoch34)           | High Range Cal Resistor - epoch 34          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                   | S              |
| 3664      | 2    | 8Sec_SciCalib_ICTTemp#1(epoch34 - Spare)                | ICT Temp 1 - epoch 34 - Spare               | N/A         | N/A                                                    | U              |
| 3666      | 14   | 8Sec SciCalib ICTTemp#1(epoch34)                        | ICT Temp 1 - epoch 34                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969         | S              |
| 3680      | 2    | 8Sec SciCalib ICTTemp#2(epoch34 - Spare)                | ICT Temp 2 - epoch 34 - Spare               | N/A         | N/A                                                    | U              |
| 3682      | 14   | 8Sec SciCalib ICTTemp#2(epoch34)                        | ICT Temp 2 - epoch 34                       | °C          | 6.05758E-09. 0.006313351. 23.5785997                   | S              |
| 3696      | 2    | 8Sec SciCalib IECCACalibResistorTemp(epoch35 - Spare)   | IE CCA Cal Resistor Temp - epoch 35 - Spare | N/A         | N/A                                                    | U              |
| 3698      | 14   | 8Sec SciCalib IECCACalibResistorTemp(epoch35)           | IE CCA Cal Resistor Temp - epoch 35         | °C          | 0. 0. 0.006324509. 23.61571478                         | S              |
| 3712      | 2    | 8Sec SciCalib LowRangeCalibResistor(epoch35 - Spare)    | Low Range Cal Resistor - epoch 35 - Spare   | N/A         | N/A                                                    | Ŭ              |
| 3714      | 14   | 8Sec SciCalib LowRangeCalibResistor(epoch35)            | Low Range Cal Resistor - epoch 35           | °C          | 0. 0. 0.006324509. 23.61571478                         | s              |
| 3728      | 2    | 8Sec SciCalib HighRangeCalibResistor(epoch35 - Spare)   | High Range Cal Resistor - epoch 35 - Spare  | N/A         | N/A                                                    | Ū              |
| 3730      | 14   | 8Sec SciCalib HighRangeCalibResistor(epoch35)           | High Range Cal Resistor - epoch 35          | °C          | 0.0.0.006324509.23.61571478                            | s              |
| 3744      | 2    | 8Sec. SciCalib ICTTemp#1(epoch35 - Spare)               | ICT Temp 1 - epoch 35 - Spare               | N/A         | N/A                                                    | Ŭ              |
| 3746      | - 14 | 8Sec. SciCalib ICTTemp#1(epoch35)                       | ICT Temp 1 - epoch 35                       | °C          | 6 43737E-09 0 006293816 22 92502969                    | s              |
| 3760      | 2    | 8Sec. SciCalib ICTTemp#2(enoch35 - Spare)               | ICT Temp 2 - enoch 35 - Spare               | N/A         | N/A                                                    | - ŭ            |
| 3762      | 14   | 8Sec. SciCalib ICTTemp#2(epoch35)                       | ICT Temp 2 - epoch 35                       | °C          | 6.05758E-09.0.006313351.23.5785997                     | s              |
| 3776      | 2    | 8Sec. SciCalib IECCACalibResistorTemp(epoch36 - Spare)  | IE CCA Cal Resistor Temp - enoch 36 - Spare | N/A         | N/A                                                    | Ŭ              |
| 3778      | - 14 | 8Sec. SciCalib IECCACalibResistorTemp(epoch36)          | IE CCA Cal Resistor Temp - epoch 36         | °C          | 0 0 0 006324509 23 61571478                            | s              |
| 3792      | 2    | 8Sec. SciCalib LowRangeCalibResistor(enoch36 - Spare)   | Low Range Cal Resistor - enoch 36 - Snare   | N/A         | N/A                                                    | - ŭ            |
| 3794      | 14   | 8Sec. SciCalib LowRangeCalibResistor(epoch36)           | low Range Cal Resistor - epoch 36           | °C          | 0 0 0 006324509 23 61571478                            | s              |
| 3808      | 2    | 8Sec. SciCalib, HighRangeCalibResistor(enoch36 - Spare) | High Range Cal Resistor - enoch 36 - Spare  | N/A         | N/A                                                    | - ŭ            |
| 3810      | 14   | 8Sec. SciCalib, HighRangeCalibResistor(epoch36)         | High Range Cal Resistor - enoch 36          | °C          | 0 0 0 006324509 23 61571478                            | s              |
| 3824      | 2    | 8Sec. SciCalib. ICTTemp#1(enoch36 - Spare)              | ICT Temp 1 - enoch 36 - Spare               | N/A         | N/A                                                    | - ŭ            |
| 3826      | 14   | 8Sec. SciCalib ICTTemp#1(epoch36)                       | ICT Temp 1 - enoch 36                       | °C          | 6.43737E-09.0.006293816.22.92502969                    | ŝ              |
| 3840      | 2    | 8Sec. SciCalib_ICTTemp#2(enoch36 - Spare)               | ICT Temp 2 - enoch 36 - Spare               | N/A         | N/A                                                    | - ŭ            |
| 3842      | 14   | 8Sec. SciCalib ICTTemp#2(epoch36)                       | ICT Temp 2 - enoch 36                       | °C          | 6.05758E-09.0.006313351.23.5785997                     | s              |
| 3856      | 2    | 8Sec. SciCalib IECCACalibResistorTemp(enoch37 - Spare)  | IF CCA Cal Resistor Temp - enoch 37 - Spare | N/A         | Ν/Δ                                                    | - ŭ            |
| 3858      | 14   | 8Sec. SciCalib IECCACalibResistorTemp(epochor)          | IF CCA Cal Resistor Temp - epoch 37         | °C          | 0 0 0 006324509 23 61571478                            | ŝ              |
| 3872      | 2    | 8Sec. SciCalib LowRangeCalibResistor(enoch37 - Spare)   | Low Range Cal Resistor - enoch 37 - Spare   | N/A         | N/A                                                    | - ŭ            |
| 3874      | 14   | 8Sec. SciCalib LowBangeCalibResistor(enoch37)           | Low Range Cal Resistor - enoch 37           | °C          | 0 0 0 006324509 23 61571478                            | ŝ              |
| 3888      | 2    | 8Sec. SciCalib, HighRangeCalibResistor(enoch37 - Spare) | Hinh Range Cal Resistor - enoch 37 - Share  | N/A         | Ν/Δ                                                    | - ŭ            |
| 3890      | 14   | 8Sec. SciCalib, HighBangeCalibResistor(epocher) 00000   | High Range Cal Resistor - enoch 37          | °C          | 0 0 0 006324509 23 61571478                            | ŝ              |
| 3904      | 2    | 8Sec. SciCalib ICTTemp#1(enoch37 - Spare)               | ICT Temp 1 - enoch 37 - Snare               | N/A         | N/A                                                    | Ť              |
| 3906      | 14   | 8Sec. SciCalib ICTTemp#1(epoch37)                       | ICT Temp 1 - enoch 37                       | °C          | 6 43737E-09 0 006293816 22 92502969                    | Š              |
| 3920      | 2    | 8Sec. SciCalib. ICTTemp#2(enoch37 - Spare)              | ICT Temp 2 - enoch 37 - Spare               | N/A         | N/A                                                    | 1 ŭ            |
| 3922      | 14   | 8Sec. SciCalib ICTTemn#2(epoch37)                       | ICT Temp 2 - epoch 37                       | °C.         | 6 05758F-09 0 006313351 23 5785997                     | s              |
| 3936      | 2    | 8Sec. SciCalib JECCACalibResistorTemp(epoch38 - Spare)  | IF CCA Cal Resistor Temp - enoch 38 - Spare | N/A         | N/A                                                    | <del>- Ť</del> |
| 3938      | 14   | 8Sec SciCalib IECCACalibResistorTemp(epoch38)           | IE CCA Cal Resistor Temp - epoch 38         | °C −        | -, -, 0, 0, 0.006324509, 23.61571478                   | Š              |
| L,        |      |                                                         |                                             |             | , , , , ,                                              | 1 -            |
|           |      |                                                         |                                             |             |                                                        |                |

|           | Bit     |                                                        |                                             | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                  |           |
|-----------|---------|--------------------------------------------------------|---------------------------------------------|-------------|-------------------------------------------------------------------------|-----------|
| Start Bit | Size    | Mnemonic Name                                          | Description                                 | or          | or                                                                      | Data Type |
|           | 0120    |                                                        |                                             | State Value | State Name                                                              |           |
| 3952      | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch38 - Spare)   | Low Range Cal Resistor - epoch 38 - Spare   | N/A         | N/A                                                                     | U         |
| 3954      | 14      | 8Sec_SciCalib_LowRangeCalibResistor(epoch38)           | Low Range Cal Resistor - epoch 38           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 3968      | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch38 - Spare)  | High Range Cal Resistor - epoch 38 - Spare  | N/A         | N/A                                                                     | U         |
| 3970      | 14      | 8Sec_SciCalib_HighRangeCalibResistor(epoch38)          | High Range Cal Resistor - epoch 38          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 3984      | 2       | 8Sec_SciCalib_ICTTemp#1(epoch38 - Spare)               | ICT Temp 1 - epoch 38 - Spare               | N/A         | N/A                                                                     | U         |
| 3986      | 14      | 8Sec_SciCalib_ICTTemp#1(epoch38)                       | ICT Temp 1 - epoch 38                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969                          | S         |
| 4000      | 2       | 8Sec_SciCalib_ICTTemp#2(epoch38 - Spare)               | ICT Temp 2 - epoch 38 - Spare               | N/A         | N/A                                                                     | U         |
| 4002      | 14      | 8Sec_SciCalib_ICTTemp#2(epoch38)                       | ICT Temp 2 - epoch 38                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997                           | S         |
| 4016      | 2       | 8Sec_SciCalib_LaserDiodeCurrent(epoch39 - Spare)       | Laser Diode Current - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4018      | 14      | 8Sec_SciCalib_LaserDiodeCurrent(epoch39)               | Laser Diode Current - epoch 39              | mAmps       | -, -, -, 3.05176E-06, 0.035                                             | S         |
| 4032      | 2       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch39 - Spare)  | IE CCA Cal Resistor Temp - epoch 39 - Spare | N/A         | N/A                                                                     | U         |
| 4034      | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epoch39)          | IE CCA Cal Resistor Temp - epoch 39         | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 4048      | 2       | 8Sec_SciCalib_LowRangeCalibResistor(epoch39 - Spare)   | Low Range Cal Resistor - epoch 39 - Spare   | N/A         | N/A                                                                     | U         |
| 4050      | 14      | 8Sec_SciCalib_LowRangeCalibResistor(epoch39)           | Low Range Cal Resistor - epoch 39           | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 4064      | 2       | 8Sec_SciCalib_HighRangeCalibResistor(epoch39 - Spare)  | High Range Cal Resistor - epoch 39 - Spare  | N/A         | N/A                                                                     | U         |
| 4066      | 14      | 8Sec_SciCalib_HighRangeCalibResistor(epoch39)          | High Range Cal Resistor - epoch 39          | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 4080      | 2       | 8Sec_SciCalib_ICTTemp#1(epoch39 - Spare)               | ICT Temp 1 - epoch 39 - Spare               | N/A         | N/A                                                                     | U         |
| 4082      | 14      | 8Sec_SciCalib_ICTTemp#1(epoch39)                       | ICT Temp 1 - epoch 39                       | °C          | -, -, -, 6.43737E-09, 0.006293816, 22.92502969                          | S         |
| 4096      | 2       | 8Sec_SciCalib_ICTTemp#2(epoch39 - Spare)               | ICT Temp 2 - epoch 39 - Spare               | N/A         | N/A                                                                     | U         |
| 4098      | 14      | 8Sec_SciCalib_ICTTemp#2(epoch39)                       | ICT Temp 2 - epoch 39                       | °C          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997                           | S         |
| 4112      | 2       | 8Sec_SciCalib_LaserDiodeTemp(epoch39 - Spare)          | Laser Diode Temp - epoch 39 - Spare         | N/A         | N/A                                                                     | U         |
| 4114      | 14      | <pre>8Sec_SciCalib_LaserDiodeTemp(epoch39)</pre>       | Laser Diode Temp - epoch 39                 | °C          | -, -, 0, 0, 0.006324509, 23.61571478                                    | S         |
| 4128      | 2       | 8Sec_SciCalib_BeamsplitterTemp#1(epoch39 - Spare)      | Beamsplitter Temp 1 - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4130      | 14      | 8Sec_SciCalib_BeamsplitterTemp#1(epoch39)              | Beamsplitter Temp 1 - epoch 39              | °C          | -, -, -, 0.006357838, 23.30026943                                       | S         |
| 4144      | 2       | 8Sec_SciCalib_OMAStructureInputTemp#1(epoch39 - Spare) | OMA Struct Input Temp 1 - epoch 39 - Spare  | N/A         | N/A                                                                     | U         |
| 4146      | 14      | 8Sec_SciCalib_OMAStructureInputTemp#1(epoch39)         | OMA Struct Input Temp 1 - epoch 39          | °C          | -, -, -, 0.006365579,23.59237265                                        | S         |
| 4160      | 2       | 8Sec_SciCalib_OMAStructureInputTemp#2(epoch39 - Spare) | OMA Struct Input Temp 2 - epoch 39 - Spare  | N/A         | N/A                                                                     | U         |
| 4162      | 14      | 8Sec_SciCalib_OMAStructureInputTemp#2(epoch39)         | OMA Struct Input Temp 2 - epoch 39          | °C          | -, -, -, 0.006363543, 23.63665915                                       | S         |
| 4176      | 2       | 8Sec_SciCalib_SSMScanMirrorTemp(epoch39 - Spare)       | SSM Scan Mirror Temp - epoch 39 - Spare     | N/A         |                                                                         | U         |
| 4178      | 14      | 8Sec_SciCalib_SSMScanMirrorTemp(epoch39)               | SSM Scan Mirror Temp - epoch 39             | N/A         |                                                                         | S         |
| 4192      | 2       | 8Sec_SciCalib_SSMScanMirrorBaffleTemp(epoch39 - Spare) | SSM ScanMirror BaffleTemp - epoch39 - Spare | N/A         | N/A                                                                     | U         |
| 4194      | 14      | 8Sec_SciCalib_SSMScanMirrorBaffleTemp(epoch39)         | SSM ScanMirror BaffleTemp - epoch 39        | °K          | -, -, -, 0.006357117,29.02                                              | S         |
| 4208      | 2       | 8Sec_SciCalib_Stage2CoolerTemp(epoch39 - Spare)        | Stage 2 Cooler Temp - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4210      | 14      | 8Sec_SciCalib_Stage2CoolerTemp(epoch39)                | Stage 2 Cooler Temp - epoch 39              | °K          | -4.20953E-20, 2.04113E-15, -3.80786E-11, 3.3213E-07, 0.0286777, 70.7661 | S         |
| 4224      | 2       | 8Sec_SciCalib_Stage4CoolerTemp(epoch39 - Spare)        | Stage 4 Cooler Temp - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4226      | 14      | 8Sec_SciCalib_Stage4CoolerTemp(epoch39)                | Stage 4 Cooler Temp - epoch 39              | ۴K          | -, -, -, 0.007290387, 33.48383                                          | S         |
| 4240      | 2       | 8Sec_SciCalib_Stage1CoolerTemp(epoch39 - Spare)        | Stage 1 Cooler Temp - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4242      | 14      | 8Sec_SciCalib_Stage1CoolerTemp(epoch39)                | Stage 1 Cooler Temp - epoch 39              | °К          | -, -, -, 0.030142016, 25.544758                                         | S         |
| 4256      | 2       | 8Sec_SciCalib_Stage3Cooler I emp(epoch39 - Spare)      | Stage 3 Cooler Temp - epoch 39 - Spare      | N/A         | N/A                                                                     | U         |
| 4258      | 14      | 8Sec_SciCalib_Stage3CoolerTemp(epoch39)                | Stage 3 Cooler Temp - epoch 39              | °К          | -, -, -, 0.009856965, 33.344107                                         | S         |
| 4272      | 2       | 8Sec_SciCalib_TelescopeTemp#1(epoch39 - Spare)         | Telescope Temp 1 - epoch 39 - Spare         | N/A         | N/A                                                                     | U         |
| 4274      | 14      | 8Sec_SciCalib_TelescopeTemp#1(epoch39)                 | Telescope Temp 1 - epoch 39                 | 3C          | -, -, -, 0.012207031,0                                                  | S         |
| 4288      | 2       | 8Sec_SciCalib_IECCACalibResistorTemp(epoch40 - Spare)  | IE CCA Cal Resistor Temp - epoch 40 - Spare | N/A         | N/A                                                                     | U         |
| 4290      | 14      | 8Sec_SciCalib_IECCACalibResistorTemp(epoch40)          | IE CUA Cal Resistor Temp - epoch 40         | °C<br>N/A   | -, -, 0, 0, 0.006324509, 23.61571478                                    | l S       |
| 4304      | 2       | Sec_Sciualib_LowKangeCalibResistor(epocn40 - Spare)    | Low Range Cal Resistor - epoch 40 - Spare   | N/A         | N/A                                                                     |           |
| 4306      | 14      | osec_sciulin_Lowkangeualinkesistor(epoch40)            | Low Kange Cal Kesistor - epoch 40           | *C          | -, -, U, U, U.UU63245U9, 23.61571478                                    | 5         |
| 4320      | 2       | obec_bolcalib_HighKangeCalibKesistor(epocn40 - Spare)  | High Kange Cal Resistor - epoch 40 - Spare  | N/A         | N/A                                                                     | <u> </u>  |
| 4322      | 14      | obec_ocicalib_HighKangeCalibKesistor(epoch40)          |                                             | -C          | -, -, U, U, U.UU03245U9, 23.01571478                                    |           |
| 4330      | 2<br>14 | obec_SciCalib_ICTTerre#4(erect=40)                     | ICT Temp 1 - epocn 40 - Spare               | N/A         | N/A                                                                     | U<br>O    |
| 4338      | 14      | oSec_SciCalib_ICTTemp#1(epocn40)                       |                                             |             | -, -, -, 0.43737E-09, 0.000293810, 22.92002969                          |           |
| 4352      | 2       | obec_SciCalib_ICTTemp#2(epocn40 - Spare)               | ICT Temp 2 - epoch 40 - Spare               | N/A         | N/A                                                                     |           |
| 4354      | 14      | oSec_SciUalib_IUTTemp#2(epocn40)                       | ICT Temp 2 - epoch 40                       | -0          | -, -, -, 6.05758E-09, 0.006313351, 23.5785997                           | 5         |

#### 4.2.4.3 Engineering Data

The CrIS generates an engineering packet in APID 1290 every 30 scans (or 4 minutes). The extensive contents of this packet include tables of calibration target emissivity versus frequency, Instrument Line Shape (ILS) curve fitting parameters, calibration of the neon source wavelength, polarization change versus wavelength for the Earth Scene and Deep Space FORs, Science/Calibration Telemetry conversion coefficients and limits, field of view mapping parameters, bit trim parameters, jitter correction parameters and neon laser calibration data. The packet has a fixed length of 7730 octets. Figure 4.2-11 demonstrates the format of the APID 1290 packet. The corresponding table of user data fields does not contain repeating mnemonics because it would take over 200 pages to do so. Table 4.2.7 contains enough of the unique fields in order to determine where they are repeated. The size of repeated fields are shown.



| Figure 4.2-11 | CrIS | Engineering | Packet | Format |
|---------------|------|-------------|--------|--------|
|               |      |             |        |        |

| Start Bit | Bit  | Mnemonic Name                                         | Description                                               | Units<br>or | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or | Data Type |
|-----------|------|-------------------------------------------------------|-----------------------------------------------------------|-------------|--------------------------------------------------------------|-----------|
|           | Size |                                                       |                                                           | State Value | State Name                                                   |           |
| 0         | 11   | 4Min Eng PCEAppFSWVer                                 | PCE Application FSW Version                               | N/A         | N/A                                                          | U         |
| 11        | 5    | 4Min Eng InstrumentID                                 | Instrument ID                                             | N/A         | N/A                                                          | Ū         |
| 16        | 16   | 4Min Eng CRC                                          | CRC                                                       | N/A         | N/A                                                          | U         |
| 32        | 16   | 4Min_EngPktFormatVersion                              | Packet Version #                                          | N/A         | N/A                                                          | U         |
| 48        | 32   | 4Min_Eng_EffectiveNeonWavelength                      | Effective Neon Bulb Wavelength                            | N/A         | -, -, -, 8, 1e-5, 0                                          | U         |
| 80        | 8    | 4Min Eng MW Offset from LW Metrology Laser Wavelength | Midwave Offset from Longwave Metrology Laser Wavelength   | ppm         | N/A                                                          | U         |
| 88        | 8    | 4Min Eng SW Offset from LW Metrology Laser Wavelength | Shortwave Offset from Longwave Metrology Laser Wavelength | ppm         | N/A                                                          | U         |
| 96        | 32   | 4Min_Eng_LW_FOV1_LowerBandC0                          | Longwave FOV1 Lower Band C0                               | N/A         | N/A                                                          | F         |
| 128       | 32   | 4Min_Eng_LW_FOV1_LowerBandC1                          | Longwave FOV1 Lower Band C1                               | N/A         | N/A                                                          | F         |
| 160       | 32   | 4Min_Eng_LW_FOV1_LowerBandC2                          | Longwave FOV1 Lower Band C2                               | N/A         | N/A                                                          | F         |
| 192       | 32   | 4Min_Eng_LW_FOV1_LowerBandC3                          | Longwave FOV1 Lower Band C3                               | N/A         | N/A                                                          | F         |
| 224       | 32   | 4Min_Eng_LW_FOV1_LowerBandC4                          | Longwave FOV1 Lower Band C4                               | N/A         | N/A                                                          | F         |
| 256       | 32   | 4Min_Eng_LW_FOV1_UpperBandC0                          | Longwave FOV1 Upper Band C0                               | N/A         | N/A                                                          | F         |
| 288       | 32   | 4Min_Eng_LW_FOV1_UpperBandC1                          | Longwave FOV1 Upper Band C1                               | N/A         | N/A                                                          | F         |
| 320       | 32   | 4Min_Eng_LW_FOV1_UpperBandC2                          | Longwave FOV1 Upper Band C2                               | N/A         | N/A                                                          | F         |
| 352       | 32   | 4Min_Eng_LW_FOV1_UpperBandC3                          | Longwave FOV1 Upper Band C3                               | N/A         | N/A                                                          | F         |
| 384       | 32   | 4Min_Eng_LW_FOV1_UpperBandC4                          | Longwave FOV1 Upper Band C4                               | N/A         | N/A                                                          | F         |
| 416       | 32   | 4Min_Eng_LW_FOV1_MidBandC0                            | Longwave FOV1 Mid Band C0                                 | N/A         | N/A                                                          | F         |
| 448       | 32   | 4Min_Eng_LW_FOV1_MidBandC1                            | Longwave FOV1 Mid Band C1                                 | N/A         | N/A                                                          | F         |
| 480       | 32   | 4Min_Eng_LW_FOV1_MidBandC2                            | Longwave FOV1 Mid Band C2                                 | N/A         | N/A                                                          | F         |
| 512       | 32   | 4Min_Eng_LW_FOV1_MidBandC3                            | Longwave FOV1 Mid Band C3                                 | N/A         | N/A                                                          | F         |
| 544       | 32   | 4Min_Eng_LW_FOV1_MidBandC4                            | Longwave FOV1 Mid Band C4                                 | N/A         | N/A                                                          | F         |
| 576       | 480  | 4Min_Eng_LW_FOV2_*** Band C0 to C4                    | Longwave, FOV2 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 1056      | 480  | 4Min_Eng_LW_FOV3_*** Band C0 to C4                    | Longwave, FOV3 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 1536      | 480  | 4Min_Eng_LW_FOV4_*** Band C0 to C4                    | Longwave, FOV4 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 2016      | 480  | 4Min_Eng_LW_FOV5_*** Band C0 to C4                    | Longwave, FOV5 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 2496      | 480  | 4Min_Eng_LW_FOV6_*** Band C0 to C4                    | Longwave, FOV6 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 2976      | 480  | 4Min_Eng_LW_FOV7_*** Band C0 to C4                    | Longwave, FOV7 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 3456      | 480  | 4Min_Eng_LW_FOV8_*** Band C0 to C4                    | Longwave, FOV8 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 3936      | 480  | 4Min_Eng_LW_FOV9_*** Band C0 to C4                    | Longwave, FOV9 Lower, Upper and Mid Band C0-C4            | N/A         | N/A                                                          | F         |
| 4416      | 480  | 4Min_Eng_MW_FOV1_*** Band C0 to C4                    | Midwave, FOV1 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 4896      | 480  | 4Min_Eng_MW_FOV2_*** Band C0 to C4                    | Midwave, FOV2 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 5376      | 480  | 4Min_Eng_MW_FOV3_*** Band C0 to C4                    | Midwave, FOV3 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 5856      | 480  | 4Min_Eng_MW_FOV4_*** Band C0 to C4                    | Midwave, FOV4 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 6336      | 480  | 4Min_Eng_MW_FOV5_*** Band C0 to C4                    | Midwave, FOV5 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 6816      | 480  | 4Min_Eng_MW_FOV6_*** Band C0 to C4                    | Midwave, FOV6 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 7296      | 480  | 4Min_Eng_MW_FOV7_*** Band C0 to C4                    | Midwave, FOV7 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 7776      | 480  | 4Min_Eng_MW_FOV8_*** Band C0 to C4                    | Midwave, FOV8 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 8256      | 480  | 4Min_Eng_MW_FOV9_*** Band C0 to C4                    | Midwave, FOV9 Lower, Upper and Mid Band C0-C4             | N/A         | N/A                                                          | F         |
| 8736      | 480  | 4Min_Eng_SW_FOV1_*** Band C0 to C4                    | Shortwave, FOV1 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 9216      | 480  | 4Min_Eng_SW_FOV2_*** Band C0 to C4                    | Shortwave, FOV2 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 9696      | 480  | 4Min_Eng_SW_FOV3_*** Band C0 to C4                    | Shortwave, FOV3 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 10176     | 480  | 4Min_Eng_SW_FOV4_*** Band C0 to C4                    | Shortwave, FOV4 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 10656     | 480  | 4Min_Eng_SW_FOV5_*** Band C0 to C4                    | Shortwave, FOV5 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 11136     | 480  | 4Min_Eng_SW_FOV6_*** Band C0 to C4                    | Shortwave, FOV6 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 11616     | 480  | 4Min_Eng_SW_FOV7_*** Band C0 to C4                    | Shortwave, FOV7 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 12096     | 480  | 4Min_Eng_SW_FOV8_*** Band C0 to C4                    | Shortwave, FOV8 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 12576     | 480  | 4Min_Eng_SW_FOV9_*** Band C0 to C4                    | Shortwave, FOV9 Lower, Upper and Mid Band C0-C4           | N/A         | N/A                                                          | F         |
| 13056     | 16   | 4Min_Eng_LW_FOV1_CrosstrackOffsetAngle                | Longwave FOV1 Crosstrack Offset Angle                     | N/A         | N/A                                                          | S         |

| Table 4.2.7 | CrIS Engineering | Packet User | Data Fields ( | cont) |
|-------------|------------------|-------------|---------------|-------|
|-------------|------------------|-------------|---------------|-------|

| 13072     16     4Min_Eng_LW_FOV3_CrosstrackOffsetAngle     Longwave FOV2 Crosstrack Offset Angle     N/A       13088     16     4Min_Eng_LW_FOV3_CrosstrackOffsetAngle     Longwave FOV3 Crosstrack Offset Angle     N/A       13104     16     4Min_Eng_LW_FOV4_CrosstrackOffsetAngle     Longwave FOV4 Crosstrack Offset Angle     N/A       13104     16     4Min_Eng_LW_FOV5_CrosstrackOffsetAngle     Longwave FOV4 Crosstrack Offset Angle     N/A       13120     16     4Min_Eng_LW_FOV6_CrosstrackOffsetAngle     Longwave FOV6 Crosstrack Offset Angle     N/A       13136     16     4Min_Eng_LW_FOV6_CrosstrackOffsetAngle     Longwave FOV7 Crosstrack Offset Angle     N/A       13186     16     4Min_Eng_LW_FOV7_CrosstrackOffsetAngle     Longwave FOV7 Crosstrack Offset Angle     N/A       13184     16     4Min_Eng_LW_FOV7_IntrackOffsetAngle     Longwave FOV7 Crosstrack Offset Angle     N/A       13200     16     4Min_Eng_LW_FOV7_IntrackOffsetAngle     Longwave FOV2 Intrack Offset Angle     N/A       13201     16     4Min_Eng_LW_FOV3_IntrackOffsetAngle     Longwave FOV2 Intrack Offset Angle     N/A       13202     16     4Min_Eng_LW_FOV3_IntrackOffsetAngle     Longwave FOV3 Intrack Offset Angle     N/A       13202     16     4Min_Eng_LW_FOV3_IntrackOffsetAngle     Longwave FOV3 Intrack Offset Angle     N/A       13204     <                                                                                                                                                           | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A | S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S                                                                                                                                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13088       16       4Min_Eng_LW_FOV3_CrosstrackOffsetAngle       Longwave FOV3 Crosstrack Offset Angle       N/A         13104       16       4Min_Eng_LW_FOV4_CrosstrackOffsetAngle       Longwave FOV4 Crosstrack Offset Angle       N/A         13105       16       4Min_Eng_LW_FOV5_CrosstrackOffsetAngle       Longwave FOV6 Crosstrack Offset Angle       N/A         13126       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV6 Crosstrack Offset Angle       N/A         13126       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       N/A         13127       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       N/A         13128       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV2 Crosstrack Offset Angle       N/A         13200       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV2 Crosstrack Offset Angle       N/A         13222       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13284       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13284       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13284                                                                                                                                                                | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A | S           S           S           S           S           S           S           S           S           S           S           S           S           S           S           S           S           S |
| 13104         16         4Min_Eng_UW_FOV4_CrosstrackOffsetAngle         Longwave FOV4 Crosstrack Offset Angle         N/A           13120         16         4Min_Eng_UW_FOV5_CrosstrackOffsetAngle         Longwave FOV6 Crosstrack Offset Angle         N/A           13136         16         4Min_Eng_UW_FOV6_CrosstrackOffsetAngle         Longwave FOV6 Crosstrack Offset Angle         N/A           13152         16         4Min_Eng_UW_FOV7_CrosstrackOffsetAngle         Longwave FOV7 Crosstrack Offset Angle         N/A           13168         16         4Min_Eng_UW_FOV3_CrosstrackOffsetAngle         Longwave FOV8 Crosstrack Offset Angle         N/A           13168         16         4Min_Eng_UW_FOV3_CrosstrackOffsetAngle         Longwave FOV9 Crosstrack Offset Angle         N/A           13184         16         4Min_Eng_UW_FOV9_CrosstrackOffsetAngle         Longwave FOV9 Crosstrack Offset Angle         N/A           13202         16         4Min_Eng_UW_FOV2_IntrackOffsetAngle         Longwave FOV2 Intrack Offset Angle         N/A           13224         16         4Min_Eng_UW_FOV4_IntrackOffsetAngle         Longwave FOV6 Intrack Offset Angle         N/A           13226         16         4Min_Eng_UW_FOV6_IntrackOffsetAngle         Longwave FOV6 Intrack Offset Angle         N/A           13228         16         4Min_Eng_UW_FOV6_IntrackOffsetAngle         Longw                                                                                                           | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A | S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S                                                                                                                                                                |
| 13120       16       4Min_Eng_LW_FOV5_CrosstrackOffsetAngle       Longwave FOV5 Crosstrack Offset Angle       N/A         13138       16       4Min_Eng_LW_FOV5_CrosstrackOffsetAngle       Longwave FOV6 Crosstrack Offset Angle       N/A         13138       16       4Min_Eng_LW_FOV5_CrosstrackOffsetAngle       Longwave FOV7 Crosstrack Offset Angle       N/A         13188       16       4Min_Eng_LW_FOV9_CrosstrackOffsetAngle       Longwave FOV9 Crosstrack Offset Angle       N/A         13184       16       4Min_Eng_LW_FOV9_CrosstrackOffsetAngle       Longwave FOV9 Crosstrack Offset Angle       N/A         13184       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13200       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13201       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV2 Intrack Offset Angle       N/A         13222       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13224       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13226       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13228       16 <td>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A</td> <td>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S<br/>S</td> | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A | S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S                                                                                                                                                      |
| 13136       16       4Min_Eng_LW_FOV6_CrosstrackOffsetAngle       Longwave FOV6 Crosstrack Offset Angle       N/A         13152       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       N/A         13168       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       N/A         13184       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13200       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13201       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13202       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13202       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13282       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV4 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13280       16                                                                                                                                                                               | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A        | S<br>S<br>S<br>S<br>S<br>S<br>S<br>S<br>S                                                                                                                                                                     |
| 13152       16       4Min_Eng_LW_FOV7_CrosstrackOffsetAngle       Longwave FOV7 Crosstrack Offset Angle       N/A         13168       16       4Min_Eng_LW_FOV3_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       N/A         13184       16       4Min_Eng_LW_FOV3_CrosstrackOffsetAngle       Longwave FOV9 Crosstrack Offset Angle       N/A         13200       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13216       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV2 Intrack Offset Angle       N/A         13222       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13250       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13296       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13312       16                                                                                                                                                                               | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A               | S<br>S<br>S<br>S<br>S<br>S<br>S<br>S                                                                                                                                                                          |
| 13168       16       4Min_Eng_LW_FOV8_CrosstrackOffsetAngle       Longwave FOV8 Crosstrack Offset Angle       NA         13184       16       4Min_Eng_LW_FOV9_CrosstrackOffsetAngle       Longwave FOV9 Crosstrack Offset Angle       NA         13200       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13216       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13222       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13228       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13281       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13282       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13342       16       4Min_Eng                                                                                                                                                                        | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A                      | S<br>S<br>S<br>S<br>S<br>S                                                                                                                                                                                    |
| 13184       16       4Min_Eng_LW_FOV9_CrosstrackOffsetAngle       Longwave FOV9 Crosstrack Offset Angle       NA         13200       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       NA         13216       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV2 Intrack Offset Angle       NA         13232       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       NA         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV7 Intrack Offset Angle       N/A         13321       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV1                                                                                                                                                                        | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A                             | S<br>S<br>S<br>S<br>S                                                                                                                                                                                         |
| 13200       16       4Min_Eng_LW_FOV1_IntrackOffsetAngle       Longwave FOV1 Intrack Offset Angle       N/A         13216       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV2 Intrack Offset Angle       N/A         13232       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV7 Intrack Offset Angle       N/A         13329       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV1_Diameter       Longwave FOV9 Intrack Offset Angle       N/A         13344       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV2 Diameter       N/A         13360       16       4Min_Eng_LW_FOV2_Diameter       Longwave                                                                                                                                                                                  | N/A<br>N/A<br>N/A<br>N/A<br>N/A                                    | S<br>S<br>S<br>S                                                                                                                                                                                              |
| 13216       16       4Min_Eng_LW_FOV2_IntrackOffsetAngle       Longwave FOV2 Intrack Offset Angle       N/A         13232       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13290       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13320       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13321       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV3 Intrack Offset Angle       N/A         13344       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV3 Diameter       N/A         13360       16       4Min_Eng_LW_FOV3_Diameter       Longwave                                                                                                                                                                                  | N/A<br>N/A<br>N/A<br>N/A                                           | \$<br>S                                                                                                                                                                                                       |
| 13232       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV3 Intrack Offset Angle       N/A         13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV4 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV7_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13290       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13312       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13324       16       4Min_Eng_LW_FOV3_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13360       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV2 Diameter       N/A         13376       16       4Min_Eng_LW_FOV3_Diameter <td< td=""><td>N/A<br/>N/A<br/>N/A</td><td>S<br/>S</td></td<>                                                                                                                         | N/A<br>N/A<br>N/A                                                  | S<br>S                                                                                                                                                                                                        |
| 13248       16       4Min_Eng_LW_FOV4_IntrackOffsetAngle       Longwave FOV4 Intrack Offset Angle       N/A         13264       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV6 Intrack Offset Angle       N/A         13290       16       4Min_Eng_LW_FOV6_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13312       16       4Min_Eng_LW_FOV8_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV1_Diameter       Longwave FOV3 Intrack Offset Angle       N/A         13340       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13360       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13376       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter                                                                                                                                                                                          | N/A<br>N/A                                                         | S                                                                                                                                                                                                             |
| 13264       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13280       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13290       16       4Min_Eng_LW_FOV5_IntrackOffsetAngle       Longwave FOV5 Intrack Offset Angle       N/A         13212       16       4Min_Eng_LW_FOV8_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13344       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV2 Diameter       N/A         13360       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13376       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13392       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13408       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A                                                                                                                                                                                                                  | N/A                                                                |                                                                                                                                                                                                               |
| 13280     16     4Min_Eng_LW_FOV6_IntrackOffsetAngle     Longwave FOV6 Intrack Offset Angle     N/A       13296     16     4Min_Eng_LW_FOV7_IntrackOffsetAngle     Longwave FOV7 Intrack Offset Angle     N/A       13312     16     4Min_Eng_LW_FOV8_IntrackOffsetAngle     Longwave FOV8 Intrack Offset Angle     N/A       13328     16     4Min_Eng_LW_FOV9_IntrackOffsetAngle     Longwave FOV9 Intrack Offset Angle     N/A       13328     16     4Min_Eng_LW_FOV9_IntrackOffsetAngle     Longwave FOV9 Intrack Offset Angle     N/A       13344     16     4Min_Eng_LW_FOV1_Diameter     Longwave FOV9 Intrack OffsetAngle     N/A       13360     16     4Min_Eng_LW_FOV2_Diameter     Longwave FOV3 Diameter     N/A       13376     16     4Min_Eng_LW_FOV3_Diameter     Longwave FOV3 Diameter     N/A       13392     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A       1348     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A                                                                                                                                                                                                                                                                                                                                                                          | N1/A                                                               | S                                                                                                                                                                                                             |
| 13296     16     4Min_Eng_LW_FOV7_IntrackOffsetAngle     Longwave FOV7 Intrack Offset Angle     N/A       13312     16     4Min_Eng_LW_FOV8_IntrackOffsetAngle     Longwave FOV8 Intrack Offset Angle     N/A       13328     16     4Min_Eng_LW_FOV9_IntrackOffsetAngle     Longwave FOV9 Intrack Offset Angle     N/A       13328     16     4Min_Eng_LW_FOV1_Diameter     Longwave FOV9 Intrack Offset Angle     N/A       13344     16     4Min_Eng_LW_FOV1_Diameter     Longwave FOV2 Diameter     N/A       13300     16     4Min_Eng_LW_FOV2_Diameter     Longwave FOV2 Diameter     N/A       13376     16     4Min_Eng_LW_FOV3_Diameter     Longwave FOV3 Diameter     N/A       13392     16     4Min_Eng_LW_FOV4_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                | S                                                                                                                                                                                                             |
| 13312       16       4Min_Eng_LW_FOV8_IntrackOffsetAngle       Longwave FOV8 Intrack Offset Angle       N/A         13328       16       4Min_Eng_LW_FOV9_IntrackOffsetAngle       Longwave FOV9 Intrack Offset Angle       N/A         13344       16       4Min_Eng_LW_FOV1_Diameter       Longwave FOV9 Intrack Offset Angle       N/A         13360       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV2 Diameter       N/A         13360       16       4Min_Eng_LW_FOV2_Diameter       Longwave FOV2 Diameter       N/A         13376       16       4Min_Eng_LW_FOV3_Diameter       Longwave FOV3 Diameter       N/A         13392       16       4Min_Eng_LW_FOV4_Diameter       Longwave FOV3 Diameter       N/A         13484       16       4Min_Eng_LW_FOV5_Diameter       Longwave FOV3 Diameter       N/A         13492       16       4Min_Eng_LW_FOV5_Diameter       Longwave FOV3 Diameter       N/A         13408       16       4Min_Eng_LW_FOV5_Diameter       Longwave FOV3 Diameter       N/A         13408       16       4Min_Eng_LW_FOV5_Diameter       Longwave FOV3 Diameter       N/A                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                                                                | S                                                                                                                                                                                                             |
| 13328     16     4Min_Eng_LW_FOV9_IntrackOffsetAngle     Longwave FOV9 Intrack Offset Angle     N/A       13344     16     4Min_Eng_LW_FOV1_Diameter     Longwave FOV1 Diameter     N/A       13360     16     4Min_Eng_LW_FOV2_Diameter     Longwave FOV2 Diameter     N/A       13376     16     4Min_Eng_LW_FOV3_Diameter     Longwave FOV3 Diameter     N/A       13392     16     4Min_Eng_LW_FOV3_Diameter     Longwave FOV3 Diameter     N/A       13392     16     4Min_Eng_LW_FOV3_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A       13408     16     4Min_Eng_LW_FOV5_Diameter     Longwave FOV3 Diameter     N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                | S                                                                                                                                                                                                             |
| 13344         16         4Min_Eng_LW_FOV1_Diameter         Longwave FOV1 Diameter         N/A           13360         16         4Min_Eng_LW_FOV2_Diameter         Longwave FOV2 Diameter         N/A           13376         16         4Min_Eng_LW_FOV3_Diameter         Longwave FOV3 Diameter         N/A           13392         16         4Min_Eng_LW_FOV3_Diameter         Longwave FOV3 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV3 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV3 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                | S                                                                                                                                                                                                             |
| 13360         16         4Min_Eng_LW_FOV2_Diameter         Longwave FOV2 Diameter         N/A           13376         16         4Min_Eng_LW_FOV3_Diameter         Longwave FOV3 Diameter         N/A           13392         16         4Min_Eng_LW_FOV4_Diameter         Longwave FOV4 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV4 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                | U                                                                                                                                                                                                             |
| 13376         16         4Min_Eng_LW_FOV3_Diameter         Longwave FOV3 Diameter         N/A           13392         16         4Min_Eng_LW_FOV4_Diameter         Longwave FOV4 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                | U                                                                                                                                                                                                             |
| 13392         16         4Min_Eng_LW_FOV4_Diameter         Longwave FOV4 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A           13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                | U                                                                                                                                                                                                             |
| 13408         16         4Min_Eng_LW_FOV5_Diameter         Longwave FOV5 Diameter         N/A           14404         40         40         50/0 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                | U                                                                                                                                                                                                             |
| 40404 40 ANE En LW FOVO Dimeter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                | U                                                                                                                                                                                                             |
| 13424 16 4Min_Eng_LW_FOVo_Diameter Longwave FOVo Diameter N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                | U                                                                                                                                                                                                             |
| 13440         16         4Min_Eng_LW_FOV7_Diameter         Longwave FOV7 Diameter         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                | U                                                                                                                                                                                                             |
| 13456 16 4Min_Eng_LW_FOV8_Diameter AVA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | N/A                                                                | U                                                                                                                                                                                                             |
| 13472 16 4Min_Eng_LW_FOV9_Diameter Longwave FOV9 Diameter N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                | U                                                                                                                                                                                                             |
| 13488 16 4Min_Eng_LW_FOV5_CrosstrackMisalignment N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | N/A                                                                | S                                                                                                                                                                                                             |
| 13504 16 4Min_Eng_LW_FOV5_IntrackMisalignment Longwave FOV5 Intrack Misalignment N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | N/A                                                                | S                                                                                                                                                                                                             |
| 13520 464 varies Midwave Crosstrack, Intrack Offset Angles, Diameters and Misalignment N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A                                                                | U/S                                                                                                                                                                                                           |
| 13984 464 varies Shortwave Crosstrack, Intrack Offset Angles, Diameters and Misalignment N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | N/A                                                                | U/S                                                                                                                                                                                                           |

|           | Dia.  |                                      |                                                                                                                | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|-------|--------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | BIL   | Mnemonic Name                        | Description                                                                                                    | or          | or                                                     | Data Type |
|           | Size  |                                      |                                                                                                                | State Value | State Name                                             |           |
| 14448     | 16    | 4Min_Eng_Spare2                      | Spare2                                                                                                         | N/A         | N/A                                                    | U         |
| 14464     | 864   | 4Min Eng *# a2                       | 2nd order IR channel nonlinearity characterization parameter for (LW, MW, SW)IR, FOV (1-9) (32 bits each)      | 1/Volts     | N/A                                                    | F         |
| 15328     | 864   | 4Min Eng *# Vinst                    | output voltage due to instument background radiance and detector dark current only for (LW, MW, SW)IR, FOV (1  | Volts       | N/A                                                    | F         |
| 16192     | 864   | 4Min Eng * Modulation Efficiency     | LW, MW, SW 1-9 Modulation Efficiency (32 bits each)                                                            | %           | N/A                                                    | F         |
| 17056     | 768   | 4Min Eng * PGA Hex Setting # to Gain | (LW.MW, SW)IR channel electrical gain in Volt/Volt corresponding to PGA gain setting = (0-F)HEX (16 bits each) | Volt/Volt   | -, -, -, 4.0, 1.0e-2, 0.0                              | U         |
| 17824     | 216   | 4Min Eng *# PGA Gain HEX Setting     | (LW, MW, SW)IR FOV (1-9) PGA Gain Setting commanded to CrIS SP (8 bits each)                                   | N/A         | N/A                                                    | U         |
| 18040     | 8     | 4Min Eng Spare48                     | Spare48                                                                                                        | N/A         | -, -, -, 4.0, 1.0, 0.0                                 | U         |
|           |       |                                      | (LW, MW, SW)IR FIR filter coefficient gain relative to baseline FM1_3 FIR filter coefficients. (32 bits each)  |             |                                                        |           |
| 18048     | 96    | 4Min Eng * FIR Gain Relative to FM1  | Excludes gain changes due to bit trim mask changes.                                                            | N/A         | N/A                                                    | U         |
| 18144     | 11408 | 4Min_Eng_LW_Emissivity_*             | ICT LW Emissivity from 650.000 cm-1 to 1095.000 cm-1 in 0.625 cm-1 steps (16 bits each)                        | N/A         | -, -, -, 4.0, 1.0e-4, 0.0                              | U         |
| 29552     | 6928  | 4Min_Eng_MW_Emissivity_*             | ICT MW Emissivity from 1210.000 cm-1 to 1750.000 cm-1 in 1.250 cm-1 steps (16 bits each)                       | N/A         | -, -, -, 4.0, 1.0e-4, 0.0                              | U         |
| 36480     | 2544  | 4Min Eng SW Emissivity *             | ICT SW Emissivity from 2155.000 cm-1 to 2550.000 cm-1 in 2.5 cm-1 steps (16 bits each)                         | N/A         | -, -, -, 4.0, 1.0e-4, 0.0                              | U         |
| 39024     | 144   | 4Min_Eng_EarthScene1_P#              | Polarization Calibration Earth Scene 1, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39168     | 144   | 4Min_Eng_EarthScene2_P#              | Polarization Calibration Earth Scene 2, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39312     | 144   | 4Min_Eng_EarthScene3_P#              | Polarization Calibration Earth Scene 3, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39456     | 144   | 4Min_Eng_EarthScene4_P#              | Polarization Calibration Earth Scene 4, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39600     | 144   | 4Min_Eng_EarthScene5_P#              | Polarization Calibration Earth Scene 5, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39744     | 144   | 4Min_Eng_EarthScene6_P#              | Polarization Calibration Earth Scene 6, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 39888     | 144   | 4Min_Eng_EarthScene7_P#              | Polarization Calibration Earth Scene 7, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40032     | 144   | 4Min_Eng_EarthScene8_P#              | Polarization Calibration Earth Scene 8, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40176     | 144   | 4Min_Eng_EarthScene9_P#              | Polarization Calibration Earth Scene 9, Wavenumber #1-9, (16 bit value per wave#)                              | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40320     | 144   | 4Min_Eng_EarthScene10_P#             | Polarization Calibration Earth Scene 10, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40464     | 144   | 4Min_Eng_EarthScene11_P#             | Polarization Calibration Earth Scene 11, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40608     | 144   | 4Min_Eng_EarthScene12_P#             | Polarization Calibration Earth Scene 12, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40752     | 144   | 4Min_Eng_EarthScene13_P#             | Polarization Calibration Earth Scene 13, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 40896     | 144   | 4Min_Eng_EarthScene14_P#             | Polarization Calibration Earth Scene 14, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41040     | 144   | 4Min_Eng_EarthScene15_P#             | Polarization Calibration Earth Scene 15, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41184     | 144   | 4Min_Eng_EarthScene16_P#             | Polarization Calibration Earth Scene 16, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41328     | 144   | 4Min_Eng_EarthScene17_P#             | Polarization Calibration Earth Scene 17, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41472     | 144   | 4Min_Eng_EarthScene18_P#             | Polarization Calibration Earth Scene 18, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41616     | 144   | 4Min_Eng_EarthScene19_P#             | Polarization Calibration Earth Scene 19, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41760     | 144   | 4Min_Eng_EarthScene20_P#             | Polarization Calibration Earth Scene 20, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 41904     | 144   | 4Min_Eng_EarthScene21_P#             | Polarization Calibration Earth Scene 21, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42048     | 144   | 4Min_Eng_EarthScene22_P#             | Polarization Calibration Earth Scene 22, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42192     | 144   | 4Min_Eng_EarthScene23_P#             | Polarization Calibration Earth Scene 23, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42336     | 144   | 4Min_Eng_EarthScene24_P#             | Polarization Calibration Earth Scene 24, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42480     | 144   | 4Min_Eng_EarthScene25_P#             | Polarization Calibration Earth Scene 25, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42624     | 144   | 4Min_Eng_EarthScene26_P#             | Polarization Calibration Earth Scene 26, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42768     | 144   | 4Min_Eng_EarthScene27_P#             | Polarization Calibration Earth Scene 27, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | U         |
| 42912     | 144   | 4Min_Eng_EarthScene28_P#             | Polarization Calibration Earth Scene 28, Wavenumber #1-9, (16 bit value per wave#)                             | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                          | 0         |

## Table 4.2.7 CrIS Engineering Packet User Data Fields (cont)
| Start B | Bit  | Mnemonic Name                                              | Description                                                                                                       | Units<br>or | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or | Data Typ |
|---------|------|------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------|----------|
|         | Size |                                                            |                                                                                                                   | State Value | State Name                                                   |          |
| 43056   | 144  | 4Min Eng EarthScene29 P#                                   | Polarization Calibration Earth Scene 29, Wavenumber #1-9, (16 bit value per wave#)                                | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                                | 0        |
| 43200   | 144  | 4Min_Eng_EarthScene30_P#                                   | Polarization Calibration Earth Scene 30, Wavenumber #1-9, (16 bit value per wave#)                                | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                                | U        |
| 43344   | 144  | 4Min_Eng_DeepSpaceScene31_P#                               | Polarization Calibration Deep Space Scene #31, Wavenumber #1-9, (16 bit value per wave#)                          | N/A         | -, -, -, -, -4.0, 1.0e-3, 0.0                                | U        |
| 43488   | 144  | 4Min_Eng_W#_*WP#                                           | Polarization Wavenumbers 1-9 (16 bits each)                                                                       | N/A         | -, -, -, 4.0, 1.0, 0.0                                       | U        |
| 43632   | 16   | 4Min_Eng_ScanMirror_Emissivity(LW band)                    | LW ScanMirror Emissivity                                                                                          | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43648   | 16   | 4Min_Eng_ScanMirror_Emissivity(MW band)                    | MW ScanMirror Emissivity                                                                                          | - 1         | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43664   | 16   | 4Min_Eng_ScanMirror_Emissivity(SW band)                    | SW ScanMirror Emissivity                                                                                          |             | -, -, -, -, 4.0, 1.0e-3, 0.0                                 | U        |
| 43680   | 16   | 4Min_Eng_ScanBaffle_Emissivity(LW band)                    | LW ScanBaffle Emissivity                                                                                          | -           | -, -, -, -, 4.0, 1.0e-3, 0.0                                 | U        |
| 43696   | 16   | 4Min_Eng_ScanBaffle_Emissivity(MW band)                    | MW ScanBaffle Emissivity                                                                                          |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43712   | 16   | 4Min_Eng_ScanBaffle_Emissivity(SW band)                    | SW ScanBaffle Emissivity                                                                                          |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43728   | 16   | 4Min_Eng_InterferometerHousing_Emissivity(LW band)         | LW Interferometer Housing Emissivity                                                                              |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43744   | 16   | 4Min_Eng_InterferometerHousing_Emissivity(MW band)         | MW Interferometer Housing Emissivity                                                                              |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43760   | 16   | 4Min_Eng_InterferometerHousing_Emissivity(SW band)         | SW Interferometer Housing Emissivity                                                                              | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43776   | 16   | 4Min Eng LW ICT Baffle emissivity                          | Emissivity of ICT baffle in LWIR                                                                                  | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43792   | 16   | 4Min_Eng_MW_ICT_Baffle_emissivity                          | Emissivity of ICT baffle in MWIR                                                                                  | - 1         | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43808   | 16   | 4Min_Eng_SW_ICT_Baffle_emissivity                          | Emissivity of ICT baffle in SWIR                                                                                  | - 1         | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43824   | 16   | 4Min Eng LW Avg Earth emissivity                           | Approximate emissivity of earth view in LWIR                                                                      |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43840   | 16   | 4Min Eng MW Avg Earth emissivity                           | Approximate emissivity of earth view in MWIR                                                                      |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43856   | 16   | 4Min Eng SW Avg Earth emissivity                           | Approximate emissivity of earth view in SWIR                                                                      |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43872   | 16   | 4Min Eng Warm Beamsplitter View Factor                     | ctional environment view of external ICT environment from ICT bottom surface to the warm portion of the beamspl   | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43888   | 16   | 4Min Eng Cold Beamsplitter View Factor                     | actional environment view of external ICT environment from ICT bottom surface to the cold portion of the beamspli |             | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43904   | 16   | 4Min_Eng_Scan_Baffle_View_Factor                           | Fractional environment view of external ICT environment from ICT bottom surface to the SSM scan baffle            | - 1         | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43920   | 16   | 4Min_Eng_ICT_Baffle_View_Factor                            | Fractional environment view of external ICT environment from ICT bottom surface to the ICT baffle                 | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43936   | 16   | 4Min_Eng_OMA_and_Frame_View_Factor                         | Fractional environment view of external ICT environment from ICT bottom surface to OMA housing and frame          | - 1         | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43952   | 16   | 4Min_Eng_Space_View_Factor                                 | Fractional environment view of external ICT environment from ICT bottom surface to OMA housing and frame          | -           | -, -, -, 4.0, 1.0e-3, 0.0                                    | U        |
| 43968   | 32   | 4Min_Eng_Earth_Temperature                                 | Average earth temperature for calculatin the ICT reflected radiance from the space view                           | K           | N/A                                                          | F        |
| 44000   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #1)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 90 degree (North Pole)                | K           | N/A                                                          | F        |
| 44032   | 32   | 4Min Eng Scan Baffle Temperature Orbit Correction (Pt #2)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 72.86 degree (dark side of earth)     | K           | N/A                                                          | F        |
| 44064   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #3)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 55.71 degree (dark side of earth)     | K           | N/A                                                          | F        |
| 44096   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #4)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 38.57 degree (dark side of earth)     | K           | N/A                                                          | F        |
| 44128   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #5)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 21.43 degree (dark side of earth)     | K           | N/A                                                          | F        |
| 44160   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #6)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of 4.29 degree (dark side of earth)      | K           | N/A                                                          | F        |
| 44192   | 32   | 4Min Eng Scan Baffle Temperature Orbit Correction (Pt #7)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of -12.86 degree (dark side of earth)    | K           | N/A                                                          | F        |
| 44224   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #8)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of -30.00 degree (dark side of earth)    | K           | N/A                                                          | F        |
| 44256   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #9)  | Scan baffle temperature correction applied at spacecraft orbit lattitude of -47.14 degree (dark side of earth)    | К           | N/A                                                          | F        |
| 44288   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #10) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -64.29 degree (dark side of earth)    | K           | N/A                                                          | F        |
| 44320   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #11) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -81.43 degree (dark side of earth)    | K           | N/A                                                          | F        |
| 44352   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #12) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -81.43 degree (sun side of earth)     | K           | N/A                                                          | F        |
| 44384   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #13) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -64.29 degree (sun side of earth)     | K           | N/A                                                          | F        |
| 44416   | 32   | 4Min Eng Scan Baffle Temperature Orbit Correction (Pt #14) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -47.14 degree (sun side of earth)     | K           | N/A                                                          | F        |
| 44448   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #15) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -30.00 degree (sun side of earth)     | K           | N/A                                                          | F        |
| 44480   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction (Pt #16) | Scan baffle temperature correction applied at spacecraft orbit lattitude of -12.86 degree (sun side of earth)     | K           | N/A                                                          | F        |
| 44512   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction (Pt #17) | Scan baffle temperature correction applied at spacecraft orbit lattitude of 4.29 degree (sun side of earth)       | К           | N/A                                                          | F        |
| 44544   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #18) | Scan baffle temperature correction applied at spacecraft orbit lattitude of 21.43 degree (sun side of earth)      | К           | N/A                                                          | F        |
| 44576   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction (Pt #19) | Scan baffle temperature correction applied at spacecraft orbit lattitude of 38.57 degree (sun side of earth)      | K           | N/A                                                          | F        |
| 44608   | 32   | 4Min_Eng_Scan_Baffle_Temperature_Orbit_Correction_(Pt #20) | Scan baffle temperature correction applied at spacecraft orbit lattitude of 55.71 degree (sun side of earth)      | K           | N/A                                                          | F        |
| 44640   | 32   | 4Min Eng Scan Baffle Temperature Orbit Correction (Pt #21) | Scan baffle temperature correction applied at spacecraft orbit lattitude of 72.86 degree (sun side of earth)      | K           | N/A                                                          | F        |

# Table 4.2.7 CrIS Engineering Packet User Data Fields (cont)

| Start Bit | Bit<br>Size | Mnemonic Name                                     | Description                                                                                                       | Units<br>or<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or<br>State Name | Data Type |
|-----------|-------------|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 44672     | 16          | 4Min_Eng_Orbital_Period                           | orbital period in seconds used for implementing the scan baffle temperature correction in the ICT enviornmental m | Sec                        | N/A                                                                        | U         |
| 44688     | 16          | 4Min_Eng_Spare32                                  | Spare32                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44704     | 16          | 4Min_Eng_Spare33                                  | Spare33                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44720     | 16          | 4Min_Eng_Spare34                                  | Spare34                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44736     | 16          | 4Min_Eng_Spare35                                  | Spare35                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44752     | 16          | 4Min_Eng_Spare36                                  | Spare36                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44768     | 16          | 4Min_Eng_Spare37                                  | Spare37                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44784     | 16          | 4Min_Eng_Spare38                                  | Spare38                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44800     | 16          | 4Min_Eng_Spare39                                  | Spare39                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44816     | 16          | 4Min_Eng_Spare40                                  | Spare40                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44832     | 16          | 4Min_Eng_Spare41                                  | Spare41                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44848     | 16          | 4Min_Eng_Spare42                                  | Spare42                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44864     | 16          | 4Min_Eng_Spare43                                  | Spare43                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44880     | 16          | 4Min_Eng_Spare44                                  | Spare44                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44896     | 16          | 4Min_Eng_Spare45                                  | Spare45                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44912     | 16          | 4Min_Eng_Spare46                                  | Spare46                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44928     | 16          | 4Min_Eng_Spare47                                  | Spare47                                                                                                           | N/A                        | N/A                                                                        | U         |
| 44944     | 32          | 4Min_Eng_ICTPRT1_Coeff_Ro                         | ICTPRT1 Coeff Ro                                                                                                  | N/A                        | N/A                                                                        | F         |
| 44976     | 32          | 4Min_Eng_ICTPRT1_Coeff_a                          | ICTPRT1 Coeff a                                                                                                   | N/A                        | N/A                                                                        | F         |
| 45008     | 32          | 4Min_Eng_ICTPRT1_Coeff_b                          | ICTPRT1 Coeff b                                                                                                   | N/A                        | N/A                                                                        | F         |
| 45040     | 32          | 4Min_Eng_ICTPRT2_Coeff_Ro                         | ICTPRT2 Coeff Ro                                                                                                  | N/A                        | N/A                                                                        | F         |
| 45072     | 32          | 4Min_Eng_ICTPRT2_Coeff_a                          | ICTPRT2 Coeff a                                                                                                   | N/A                        | N/A                                                                        | F         |
| 45104     | 32          | 4Min_Eng_ICTPRT2_Coeff_b                          | ICTPRT2 Coeff b                                                                                                   | N/A                        | N/A                                                                        | F         |
| 45136     | 32          | 4Min_Eng_ICTLowRange_CalibrationResistor_Ro       | ICT Low Range CalibrationResistor Ro                                                                              | N/A                        | N/A                                                                        | F         |
| 45168     | 32          | 4Min_Eng_ICTLowRange_CalibrationResistor_a        | ICT Low Range Calibration Resistor a                                                                              | N/A                        | N/A                                                                        | F         |
| 45200     | 32          | 4Min_Eng_ICTHighRange_CalibrationResistor_Ro      | ICT High Range Calibration Resistor Ro                                                                            | N/A                        | N/A                                                                        | F         |
| 45232     | 32          | 4Min_Eng_ICTHighRange_CalibrationResistor_a       | ICT High Range Calibration Resistor a                                                                             | N/A                        | N/A                                                                        | F         |
| 45264     | 32          | 4Min_Eng_IECCA_ResistorTemperature_Ro             | IECCA Resistor Temperature Ro                                                                                     | N/A                        | N/A                                                                        | F         |
| 45296     | 32          | 4Min_Eng_IECCA_ResistorTemperature_a              | IECCA Resistor Temperature a                                                                                      | N/A                        | N/A                                                                        | F         |
| 45328     | 32          | 4Min_Eng_LaserDiode_TemperatureSlope              | Laser Diode Temperature Slope                                                                                     | N/A                        | N/A                                                                        | F         |
| 45360     | 32          | 4Min_Eng_LaserDiodeBias_CurrentSlope              | Laser Diode Bias Current Slope                                                                                    | N/A                        | N/A                                                                        | F         |
| 45392     | 32          | 4Min_Eng_Beamsplitter_Temperature1Coeff_intercept | Beamsplitter Temp1 Coeff intercept                                                                                | N/A                        | N/A                                                                        | F         |
| 45424     | 32          | 4Min_Eng_Beamsplitter_Temperature1Coeff_slope     | Beamsplitter Temp1 Coeff slope                                                                                    | N/A                        | N/A                                                                        | F         |
| 45456     | 32          | 4Min_Eng_Spare8                                   | Spare8                                                                                                            | N/A                        | N/A                                                                        | U         |
| 45488     | 32          | 4Min_Eng_Spare9                                   | Spare9                                                                                                            | N/A                        | N/A                                                                        | U         |
| 45520     | 32          | 4Min_Eng_ScanMirror_TemperatureCoeff_intercept    | Scan Mirror Temperature Coeff intercept                                                                           | N/A                        | N/A                                                                        | F         |
| 45552     | 32          | 4Min_Eng_ScanMirror_TemperatureCoeff_slope        | Scan Mirror Temperature Coeff slope                                                                               | N/A                        | N/A                                                                        | F         |
| 45584     | 32          | 4Min_Eng_ScanBaffle_TemperatureCoeff_intercept    | Scan Baffle Temperature Coeff intercept                                                                           | N/A                        | N/A                                                                        | F         |
| 45616     | 32          | 4Min_Eng_ScanBaffle_TemperatureCoeff_slope        | Scan Baffle Temperature Coeff slope                                                                               | N/A                        | N/A                                                                        | F         |
| 45648     | 32          | 4Min_Eng_OMA_StructureTemperature1Coeff_intercept | OMA Struct Temperature1 Coeff intercept                                                                           | N/A                        | N/A                                                                        | F         |
| 45680     | 32          | 4Min_Eng_OMA_StructureTemperature1Coeff_slope     | OMA Struct Temperature1 Coeff slope                                                                               | N/A                        | N/A                                                                        | F         |
| 45712     | 32          | 4Min_Eng_OMA_StructureTemperature2Coeff_intercept | OMA Struct Temperature2 Coeff intercept                                                                           | N/A                        | N/A                                                                        | F         |

# Table 4.2.7 CrIS Engineering Packet User Data Fields (cont)

| Table 4.2.7 | CrIS Engineering | Packet User | Data Fields (cont) |
|-------------|------------------|-------------|--------------------|
|-------------|------------------|-------------|--------------------|

|           |            |                                                                                            |                                                                    |             | A                                                      |           |
|-----------|------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
|           | D'I        |                                                                                            |                                                                    | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
| Start Bit | Bit        | Mnemonic Name                                                                              | Description                                                        | or          | or                                                     | Data Type |
|           | Size       |                                                                                            |                                                                    | State Value | State Name                                             |           |
| 45744     | 32         | 4Min Eng OMA StructureTemperature2Coeff slope                                              | OMA Struct Temperature2 Coeff slope                                | N/A         | N/A                                                    | F         |
| 45776     | 32         | 4Min Eng Telescope TemperatureCoeff slope                                                  | Telescope Temperature Coeff slope                                  | N/A         | N/A                                                    | F         |
| 45808     | 32         | 4Min Eng Stage1 CoolerTempCoeff slope                                                      | Stage1 Cooler Temperature Coeff slope                              | N/A         | N/A                                                    | F         |
| 45840     | 32         | 4Min Eng Stage2 CoolerTempCoeff slope                                                      | Stage2 Cooler Temperature Coeff slope                              | N/A         | N/A                                                    | F         |
| 45872     | 32         | 4Min_Eng_Stage3_CoolerTempCoeff_slope                                                      | Stage3 Cooler Temperature Coeff slope                              | N/A         | N/A                                                    | F         |
| 45904     | 32         | 4Min Eng Stage4 CoolerTempCoeff slope                                                      | Stage4 Cooler Temperature Coeff slope                              | N/A         | N/A                                                    | F         |
| 45936     | 32         | 4Min Eng SSM CrosstrackErrorCoeff intercept                                                | SSM Crosstrack Error Coeff intercept                               | N/A         | N/A                                                    | F         |
| 45968     | 32         | 4Min Eng SSM CrosstrackErrorCoeff slope                                                    | SSM Crosstrack Error Coeff slope                                   | N/A         | N/A                                                    | F         |
| 46000     | 32         | 4Min Eng SSM IntrackErrorCoeff intercept                                                   | SSM Intrack Error Coeff intercept                                  | N/A         | N/A                                                    | F         |
| 46032     | 32         | 4Min Eng SSM IntrackErrorCoeff slope                                                       | SSM Intrack Error Coeff slope                                      | N/A         | N/A                                                    | F         |
| 46064     | 16         | 4Min Eng ICT Temp1DriftLimit                                                               | ICT Temperature1 Drift Limit                                       | N/A         | 4.0. 1.0e-3. 0.0                                       | U         |
| 46080     | 16         | 4Min Eng ICT Temp2DriftLimit                                                               | ICT Temperature2 Drift Limit                                       | N/A         | -, -, -, 4.0, 1.0e-3, 0.0                              | U         |
| 46096     | 16         | 4Min Eng Beamsplitter Temp1DriftLimit                                                      | Beamsplitter Temperature1 Drift Limit                              | N/A         | -, -, -, 4.0, 1.0e-3, 0.0                              | Ū         |
| 46112     | 16         | 4Min Eng Spare12                                                                           | Spare12                                                            | N/A         | 40 10e-3 00                                            | Ū         |
| 46128     | 16         | 4Min Eng ScanMirror TempDriftLimit                                                         | Scan Mirror Temperature Drift Limit                                | N/A         | 4.0 1.0e-3 0.0                                         | Ŭ         |
| 46144     | 16         | 4Min Eng ScanBaffle TempDriftI imit                                                        | Scan Baffle Temperature Drift Limit                                | N/A         | 40 10e-3 00                                            | Ŭ         |
| 46160     | 16         | 4Min Eng OMA Structure1TempDriftl imit                                                     | OMA Structure1 Temperature Drift Limit                             | N/A         | 40 10e-3 00                                            | Ű         |
| 46176     | 16         | 4Min Eng OMA Structure2TempDriftLimit                                                      | OMA Structure2 Temperature Drift Limit                             | N/A         | 40 10e-3 00                                            | Ŭ         |
| 46192     | 16         | 4Min Eng Telescope TempDrift imit                                                          | Telescone Temperature Drift Limit                                  | N/A         | 40 10e-3 00                                            | Ű         |
| 46208     | 16         | 4Min Eng Stage1 CoolerTempDrift1 imit                                                      | Stage1 Cooler Temperature Drift Limit                              | N/A         | 40 10e-3 00                                            | Ű         |
| 46224     | 16         | 4Min Eng Stage? CoolerTempDriftLimit                                                       | Stage? Cooler Temperature Drift Limit                              | N/A         | , , , , 1.0, 1.0e-3, 0.0                               | - Ŭ       |
| 46240     | 16         | 4Min Eng Stage3 CoolerTempDriftLimit                                                       | Stage3 Cooler Temperature Drift Limit                              | N/A         | 40 10e-3 00                                            | - Ŭ       |
| 46256     | 16         | 4Min_Eng_Stage4_CoolerTempDriftLimit                                                       | Stage4 Cooler Temperature Driff Limit                              | N/A         | 40 10e-3 00                                            | - Ŭ       |
| 46272     | 16         | 4Min_Eng_LaserDiode_WavelengthDriftLimit                                                   | Laser Diode Wavelength Drift Limit                                 | Ν/Δ         | , , , , ,                                              | - Ŭ       |
| 46288     | 992        | 4Min_Eng_caserbiode_vvavelenginbrinterinte<br>4Min_Eng_ActualCrosstrackAngleRoll_EarthPos# | Actual CrTrk Angle Roll Earth Post (#=1-30, 33) 32 bits per Angle  | N/A         | -, -, -, -, -, Ο.Ο<br>Ν/Δ                              | U U       |
| 47280     | 992        | 4Min Eng ActualIntrackAnglePitch EarthPos#                                                 | Actual InTrk Angle Pitch Farth Post (#=1-30, 33) 32 bits per Angle | N/A         | N/A                                                    | - U       |
| 48272     | 32         | /Min_Eng_SSMR_to_SSMEAngle_Roll                                                            | SSMR to SSMF Angle Roll                                            | N/A         | Ν/Δ                                                    | - U       |
| 48304     | 32         | 4Min_Eng_SSMR_to_SSMEAngle_Ritch                                                           | SSMR to SSME Angle Pitch                                           | N/Δ         | Ν/Δ                                                    | U U       |
| 48336     | 32         | AMin_Eng_COMR_to_SSMEAngle_Vaw                                                             | SSMR to SSME Angle Yaw                                             | N/A         | N/A                                                    | U U       |
| 48368     | 32         | 4Min_Eng_ColMit_to_ColMit / Higle_14W                                                      | Charafa                                                            | N/A         | Ν/Δ                                                    | - U       |
| 48400     | 32         | 4Min_Eng_Opareos                                                                           | IAD to SSMD Angle Poll                                             | N/A         | N/A                                                    | 0         |
| 40400     | 32         | 4Min_Eng_IAR_to_SSMRAngle_Roll                                                             |                                                                    | N/A         | N/A                                                    | 0         |
| 40452     | 32         | 4Min_Eng_IAR_to_SSMRAngle_Yaw                                                              | IAR to SOMR Angle Fitch                                            | N/A         | Ν/Δ                                                    | U         |
| 40404     | 32         | 4Win_Eng_http://www.                                                                       | Interforomator Parciaht You                                        | N/A         | N/A                                                    | 0         |
| 40490     | 32         | 4Min_Eng_InterferometerBorsight_Faw                                                        | Interforometer Borsight Taw                                        | N/A         | N/A                                                    | 0         |
| 40320     | 22         | 4Min_Eng_REF to IARAndo Roll                                                               | CPE to IAD Angle Dell                                              | N/A         |                                                        | 0         |
| 40000     | 32         | 41111_EIIg_SDF_L0_IARAIIgle_K01                                                            | SDF to IAN Aligie Roll                                             | N/A         | N/A                                                    | 0         |
| 40092     | 32         | 4Min_Eng_SDF_to_IARAngle_Fitch                                                             | SDF to IAR Angle Filon                                             | N/A         | N/A                                                    | U         |
| 40024     | 32         | 4Wiii_Elig_SDF_to_tArkAligie_faw                                                           | SDF IU IAR Allyle faw                                              | IN/A        | N/A                                                    | 0         |
| 40000     | 10         | 4Win_Eng_Timestampolas                                                                     | I Intestantip Bias                                                 | N/A         | N/A                                                    | 0         |
| 40072     | 0          | 4Win_Eng_LW_FIRAccumulator_StopBit(Zone0)                                                  | LW FIR Accumulator Stop Bit - Zoneo                                | N/A         | N/A                                                    | 0         |
| 40000     | 0<br>16    | 4WiIII_EIIY_LVW_FIRACCUMULATOF_STARTBIL(ZONEU)                                             | Live Fire Accumulator Start Bit - Zoneu                            | N/A<br>N/A  | N/A                                                    |           |
| 40000     | 01         | 4ivin_Eng_Lvv_EndSampleIndex(ZoneU)                                                        | LW EID Assumulates Oton, Start Dit 8, End Comple Index, 727-1      | N/A         | N/A                                                    | U         |
| 40704     | 32         | 4Win_Eng_LW_tvaries(ZoneT)                                                                 | LW FIR Accumulator Stop, Start Bit & End Sample Index - 20061      | N/A         | N/A                                                    | U         |
| 40700     | - 32<br>22 | 4Win_Eng_LW_tvaries(Zone2)                                                                 | LW FIR Accumulator Stop, Start Dit & End Sample Index - 20162      | N/A<br>N/A  | IN/A                                                   | U U       |
| 40/00     | 3Z<br>22   | 4iviii1_Elig_Lvv_Varies*(Zones)                                                            | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zones      | N/A<br>N/A  | N/A                                                    |           |
| 40000     | 32         | 4Win_Eng_LVV_Varies*(Zone4)                                                                | LW FIK Accumulator Stop, Start Bit & End Sample Index - 20064      | N/A<br>N/A  | N/A<br>N/A                                             | U U       |
| 4003Z     | 32         | 4WIII_EIY_LVV_ Valles (Zulles)                                                             | Live Fire Accumulator stop, start bit & End Sample muck - 20165    | IN/A        | IN/A                                                   | U         |

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

|           | Bit  |                               |                                                                    | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|-------------------------------|--------------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
| itart Bit | Size | Mnemonic Name                 | Description                                                        | or          | or                                                     | Data Type |
|           | 0120 |                               |                                                                    | State Value | State Name                                             |           |
| 18864     | 32   | 4Min_Eng_LW_*varies*(Zone6)   | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone6      | N/A         | N/A                                                    | U         |
| 18896     | 32   | 4Min_Eng_LW_*varies*(Zone7)   | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone7      | N/A         | N/A                                                    | U         |
| 8928      | 32   | 4Min_Eng_LW_*varies*(Zone8)   | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone8      | N/A         | N/A                                                    | U         |
| 18960     | 32   | 4Min_Eng_LW_*varies*(Zone9)   | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone9      | N/A         | N/A                                                    | U         |
| 8992      | 32   | 4Min_Eng_LW_*varies*(Zone10)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone10     | N/A         | N/A                                                    | U         |
| 19024     | 32   | 4Min_Eng_LW_*varies*(Zone11)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone11     | N/A         | N/A                                                    | U         |
| 19056     | 32   | 4Min_Eng_LW_*varies*(Zone12)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone12     | N/A         | N/A                                                    | U         |
| 19088     | 32   | 4Min_Eng_LW_*varies*(Zone13)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone13     | N/A         | N/A                                                    | U         |
| 19120     | 32   | 4Min_Eng_LW_*varies*(Zone14)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone14     | N/A         | N/A                                                    | U         |
| 19152     | 32   | 4Min_Eng_LW_*varies*(Zone15)  | LW FIR Accumulator Stop, Start Bit & End Sample Index - Zone15     | N/A         | N/A                                                    | U         |
| 19184     | 512  | 4Min_Eng_MW_*varies*(Zone ##) | MW FIR Accumulator Stop, Start Bit & End Sample Index - Zones 0-15 | N/A         | N/A                                                    | U         |
| 19696     | 512  | 4Min_Eng_SW_*varies*(Zone ##) | SW FIR Accumulator Stop, Start Bit & End Sample Index - Zones 0-15 | N/A         | N/A                                                    | U         |
| 50208     | 16   | 4Min_Eng_Spare70              | Spare70                                                            | N/A         | N/A                                                    | U         |
| 50224     | 16   | 4Min_Eng_LWK1Constant         | Longwave K1 Constant                                               | N/A         | N/A                                                    | S         |
| 50240     | 16   | 4Min_Eng_LWb1Constant         | Longwave b1 Constant                                               | N/A         | N/A                                                    | S         |
| 50256     | 16   | 4Min_Eng_LWa1Constant         | Longwave a1 Constant                                               | N/A         | N/A                                                    | S         |
| 50272     | 16   | 4Min_Eng_LWb2Constant         | Longwave b2 Constant                                               | N/A         | N/A                                                    | S         |
| 50288     | 16   | 4Min_Eng_LWa2Constant         | Longwave a2 Constant                                               | N/A         | N/A                                                    | S         |
| 50304     | 16   | 4Min_Eng_LWb3Constant         | Longwave b3 Constant                                               | N/A         | N/A                                                    | S         |
| 50320     | 16   | 4Min_Eng_LWa3Constant         | Longwave a3 Constant                                               | N/A         | N/A                                                    | S         |
| 50336     | 16   | 4Min_Eng_LWb4Constant         | Longwave b4 Constant                                               | N/A         | N/A                                                    | S         |
| 50352     | 16   | 4Min_Eng_LWa4Constant         | Longwave a4 Constant                                               | N/A         | N/A                                                    | S         |
| 50368     | 16   | 4Min_Eng_LWb5Constant         | Longwave b5 Constant                                               | N/A         | N/A                                                    | S         |
| 50384     | 16   | 4Min_Eng_LWa5Constant         | Longwave a5 Constant                                               | N/A         | N/A                                                    | S         |
| 50400     | 16   | 4Min_Eng_LWb6Constant         | Longwave b6 Constant                                               | N/A         | N/A                                                    | S         |
| 50416     | 16   | 4Min_Eng_LWa6Constant         | Longwave a6 Constant                                               | N/A         | N/A                                                    | S         |
| 50432     | 16   | 4Min_Eng_LWb7Constant         | Longwave b7 Constant                                               | N/A         | N/A                                                    | S         |
| 50448     | 16   | 4Min_Eng_LWa7Constant         | Longwave a7 Constant                                               | N/A         | N/A                                                    | S         |
| 50464     | 16   | 4Min_Eng_LWb8Constant         | Longwave b8 Constant                                               | N/A         | N/A                                                    | S         |
| 50480     | 16   | 4Min_Eng_LWa8Constant         | Longwave a8 Constant                                               | N/A         | N/A                                                    | S         |
| 50496     | 16   | 4Min_Eng_LWb9Constant         | Longwave b9 Constant                                               | N/A         | N/A                                                    | S         |
| 50512     | 16   | 4Min_Eng_LWa9Constant         | Longwave a9 Constant                                               | N/A         | N/A                                                    | S         |
| 50528     | 16   | 4Min_Eng_Spare71              | Spare71                                                            | N/A         | N/A                                                    | U         |
| 50544     | 16   | 4Min_Eng_Spare72              | Spare72                                                            | N/A         | N/A                                                    | U         |
| 50560     | 16   | 4Min_Eng_Spare73              | Spare73                                                            | N/A         | N/A                                                    | U         |
| 50576     | 304  | 4Min_Eng_MW**Constant         | Midwave K#, b#, a# Constants                                       | N/A         | N/A                                                    | S         |
| 50880     | 48   | 4Min_Eng_Spare74 to 76        | Spare74, Spare75, Spare 76                                         | N/A         | N/A                                                    | U         |
| 50928     | 304  | 4Min_Eng_SW**Constant         | Shortwave K#, b#, a# Constants                                     | N/A         | N/A                                                    | S         |
|           |      | MB/III -                      |                                                                    |             |                                                        |           |

## Table 4.2.7 CrIS Engineering Packet User Data Fields (cont)

| Table 4.2.7 CrIS Engineering Packet User | Data Fields (cont) |
|------------------------------------------|--------------------|
|------------------------------------------|--------------------|

|           |       |                                             |                                                             | Units       | Conversion Coefficients (formula or C5.C4.C3.C2.C1.C0) |           |
|-----------|-------|---------------------------------------------|-------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit   | Mnemonic Name                               | Description                                                 | or          | Or                                                     | Data Type |
|           | Size  |                                             |                                                             | State Value | State Name                                             |           |
| 51232     | 32    | 4Min Eng Spare77 to 78                      | Spare77, Spare78                                            | N/A         | N/A                                                    | U         |
| 51264     | 16    | 4Min Eng LW ExtractionInfo(Raw A/D Samples) | LW Extraction Info(Raw A/D Samples)                         | N/A         | N/A                                                    | U         |
| 51280     | 3     | 4Min Eng LW ExtractionInfo(Spare)           | LW Extraction Info(Spare)                                   | N/A         | N/A                                                    | U         |
| 51283     | 5     | 4Min Eng LW ExtractionInfo(DecimationRate)  | LW Extraction Info(DecimationRate)                          | N/A         | N/A                                                    | U         |
| 51288     | 8     | 4Min_Eng_LW_ExtractionInfo(NumTaps)         | LW Extraction Info(NumTaps)                                 | N/A         | N/A                                                    | U         |
| 51296     | 16    | 4Min_Eng_MW_ExtractionInfo(Raw A/D Samples) | MW Extraction Info(Raw A/D Samples)                         | N/A         | N/A                                                    | U         |
| 51312     | 3     | 4Min_Eng_MW_ExtractionInfo(Spare)           | MW Extraction Info(Spare)                                   | N/A         | N/A                                                    | U         |
| 51315     | 5     | 4Min_Eng_MW_ExtractionInfo(DecimationRate)  | MW Extraction Info(DecimationRate)                          | N/A         | N/A                                                    | U         |
| 51320     | 8     | 4Min_Eng_MW_ExtractionInfo(NumTaps)         | MW Extraction Info(NumTaps)                                 | N/A         | N/A                                                    | U         |
| 51328     | 16    | 4Min_Eng_SW_ExtractionInfo(Raw A/D Samples) | SW Extraction Info(Raw A/D Samples)                         | N/A         | N/A                                                    | U         |
| 51344     | 3     | 4Min_Eng_SW_ExtractionInfo(Spare)           | SW Extraction Info(Spare)                                   | N/A         | N/A                                                    | U         |
| 51347     | 5     | 4Min_Eng_SW_ExtractionInfo(DecimationRate)  | SW Extraction Info(DecimationRate)                          | N/A         | N/A                                                    | U         |
| 51352     | 8     | 4Min_Eng_SW_ExtractionInfo(NumTaps)         | SW Extraction Info(NumTaps)                                 | N/A         | N/A                                                    | U         |
| 51360     | 16    | 4Min_Eng_LaserMetrology_PulsesPerSweep      | Laser Metrology Pulses Per Sweep                            | N/A         | N/A                                                    | U         |
| 51376     | 16    | 4Min_Eng_NumberOfNeonCalSweeps              | Number Of Neon Cal Sweeps                                   | N/A         | N/A                                                    | U         |
| 51392     | 32    | 4Min_Eng_NeonGasWavelength                  | Neon Gas Wavelength                                         | N/A         | -, -, -, 8.0, 1.0e-5, 0.0                              | U         |
| 51424     | 16    | 4Min_Eng_NeonCalTimestamp(Days)             | Neon Cal Timestamp - Days                                   | N/A         | N/A                                                    | U         |
| 51440     | 32    | 4Min_Eng_NeonCalTimestamp_Milliseconds      | Neon Cal Timestamp - Milliseconds                           | N/A         | N/A                                                    | U         |
| 51472     | 16    | 4Min_Eng_NeonCalRepeatTimeInterval          | Neon Cal Repeat Time Interval                               | N/A         | N/A                                                    | U         |
| 51488     | 16    | 4Min_Eng_NeonCalStartingCnt(Sample1)        | Neon Cal Starting Count - Sample1                           | N/A         | -, -, -, 1.0, 0.0                                      | U         |
| 51504     | 16    | 4Min_Eng_NeonCalStartingPartialCnt(Sample1) | Neon Cal Starting Partial Count - Sample1                   | N/A         | -, -, -, 1.0, 0.0                                      | U         |
| 51520     | 16    | 4Min_Eng_NeonCalFringeCnt(Sample1)          | Neon Cal Fringe Count - Sample1                             | N/A         | -, -, -, 1.0, 0.0                                      | U         |
| 51536     | 16    | 4Min_Eng_NeonCalEndPartialCnt(Sample1)      | Neon Cal End Partial Count - Sample1                        | N/A         | -, -, -, 1.0, 0.0                                      | U         |
| 51552     | 16    | 4Min_Eng_NeonCalEndCnt(Sample1)             | Neon Cal End Count - Sample1                                | N/A         | -, -, -, 1.0, 0.0                                      | U         |
| 51568     | 10160 | 4Min_Eng_NeonCal*varies*(Sample#)           | Neon Calibration Counts Sample 2 to 128 (127 x 5 x 16 bits) | N/A         | -, -, -, 1.0, 0.0                                      | U         |
|           |       |                                             | <sup>4</sup> 0 <sub>10</sub>                                |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       |                                             |                                                             |             |                                                        |           |
|           |       | <i>w</i>                                    |                                                             |             |                                                        |           |

## 4.2.4.4 Diagnostic Data

The CrIS generates high resolution interferograms when in Diagnostic Mode. Because the sampling of the interferogram is much finer, the CrIS limits its Diagnostic data output to one FOV per FOR. Operators select which FOV via command; the selection is reflected in the Diagnostic Mode Channel Select field of the Filter Status Word within the packet. Instead of 9 APIDs per band, Diagnostic data use one APID per IR band: APIDs 1294, 1295 and 1296 for LW, MW and SW respectively. The CrIS outputs these packets 34 times per 8 second scan if the Diagnostic Test Mode bit of the band's DSP Hardware Control Settings field in the Housekeeping Packet is set to Normal. This includes 30 diagnostic Earth FORs, 2 diagnostic Deep Space FORs and 2 diagnostic ICT FORs. If the Diagnostic Test Mode bit of a band is set to Process All frames, the CrIS outputs the APID 40 times per scan. The CrIS will exceed its allocated data rate if all three diagnostic packets are generated 40 times per scan. Each of these packets has a unique fixed length, shown below.

No bit trimming is performed in Diagnostic Mode. Each interferogram sample is put into a 16-bit word, regardless of its post-processing length or A/D resolution. Thus even a sample from a 14-bit A/D is put into a 16-bit word. With every sample of uniform length, the number of samples determines the length of the packet, as seen in Table 4.2.8.

| IR Band | Number of Samples (for each I and Q) | Packet Length<br>(including headers) |
|---------|--------------------------------------|--------------------------------------|
| LW      | 10519                                | 42106                                |
| MW      | 5427                                 | 21738                                |
| SW      | 2753                                 | 11042                                |

 Table 4.2.8 CrIS Diagnostic Interferogram Samples by IR Band

The Diagnostic packet formats are identical to the other Interferogram packets with two exceptions. First, the I data and Q data block sizes are different. Second, the "Number of I words after bit trimming" in the Operational Interferogram packet is unnecessary and not included in the Diagnostic Packet. Figure 4.2-12 lays out the structure of APIDs 1294, 1295 and 1296. Table 4.2.9 lists the contents of the User Data field of the Diagnostic Interferogram Packet.

BATCH

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

|          | Verson No. |                                                         | DACK              |                                |                   |                                                        |                    |                   |                           |                  |                         |                         |                           |                  |                 |                                |                                       |                                       |                                   |        |
|----------|------------|---------------------------------------------------------|-------------------|--------------------------------|-------------------|--------------------------------------------------------|--------------------|-------------------|---------------------------|------------------|-------------------------|-------------------------|---------------------------|------------------|-----------------|--------------------------------|---------------------------------------|---------------------------------------|-----------------------------------|--------|
|          | Verson No. |                                                         |                   | T DDIMADV I                    |                   |                                                        |                    | SECONDARY         |                           |                  |                         |                         |                           | User Dat         | ta Field        |                                |                                       |                                       |                                   | ٦      |
|          |            | Verson No. Packet Identification Packet Sequence Packet |                   |                                |                   |                                                        | Packet             | HEADER            |                           |                  |                         |                         | CrIS Scie                 | nce Header       |                 |                                |                                       |                                       | Science                           |        |
|          |            | Type<br>Indicator                                       | Sec Hdr<br>Flag   | APID                           | Sequence<br>Flags | Sequence<br>Count                                      | Length             | Start of<br>Scan  | PCE App<br>FSW<br>Version | Instrument<br>ID | Scan<br>Informatio<br>n | Scan<br>Status<br>Flags | Impulse<br>Noise<br>Count | ZPD<br>Amplitude | ZPD<br>Location | Number of<br>Convert<br>Pulses | Filter<br>Status<br>Upper<br>Register | Filter<br>Status<br>Lower<br>Register | Undecimated<br>Interferogram Data |        |
| Dit-     | 2          | 1                                                       | 1                 | 1.1                            | 2                 | 14                                                     | 1.0                | <i>C</i> <b>A</b> | 1.1                       | F                | 1.0                     | 1.0                     | 1.0                       | 1.0              | 10              | 10                             | 1.0 ,1 0                              | 10                                    | variae                            | TOTAL  |
| Bits     | 3          | 1                                                       | 1                 | 11                             | 2                 | 14                                                     | 10                 | 64                | 11                        | 5                | 16                      | 16                      | 16                        | 16               | 16              | 16                             | 16                                    | 16                                    | varies                            | varies |
| Value    | 000        |                                                         | 2                 | maniaa                         | 11                | 2                                                      | 2                  | 8                 | maniaa                    | Z                | varios                  | 4                       | varies                    | 2<br>varies      | 4               | 2                              | 4                                     | varies                                | varies                            | Varies |
|          |            | Teleme                                                  | try Packet        | Secondary<br>Header<br>Present |                   | APID Band<br>OxSOE LW<br>DxSOF MW<br>OxSOI SW<br>Figur | e 4.2-1            | 2 Cri             | IS Diag                   | Inosti           | c Inter                 | ferog                   | ram Pa                    | acket F          | Forma           | t                              |                                       |                                       |                                   |        |
| Check th | ie NPP C   | CR web                                                  | site at <u>ht</u> | tps://cice                     | ro.eos.na         | asa.gov/n                                              | i <u>pp</u> to vei | ify that t        | this Is the               | correct          | version p               | rior to us              | e.                        |                  |                 |                                |                                       |                                       |                                   |        |

| Start Bit | Bit<br>Size | Mnemonic Name                                         | Description                                                 | Units<br>or<br>State Value  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or<br>State Name | Data Type |
|-----------|-------------|-------------------------------------------------------|-------------------------------------------------------------|-----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 11          | LW_PCEAppFSWVer                                       | PCE Application FSW Version                                 | N/A                         | N/A                                                                        |           |
| 11        | 5           | LW Instrument ID                                      | Instrument ID                                               | N/A                         | N/A                                                                        |           |
| 16        | 6           | LW Schlinfo(FOR)                                      | Scan Information(Field of Regard)                           | 0<br>1-30<br>31<br>32<br>33 | ICT<br>Earth Scene #<br>Deep Space<br>UnknownFOR<br>Nadir                  |           |
| 22        | 2           | LW_ScnInfo(Sweep Dir)                                 | Scan Information(Sweep Direction)                           | 0<br>1<br>2<br>3            | Forward<br>Reverse<br>Unknown<br>Unknown                                   |           |
| 24        | 1           | LW ScnInfo(Diag Chan Err)                             | Scan Information(Diagnostic Chan, Error)                    | 0                           | False<br>True                                                              |           |
| 25        | 1           | LW Schlinfo(Impls Tbl Mem Err)                        | Scan Information/Impulse Table Memory Error)                | 0                           | False<br>True                                                              |           |
| 26        | 1           | I W. Schlafo(End of PCI Sys reached w/o EOD)          | Scan Info/End PCI Sys reached w/o EQD)                      | 0                           | False                                                                      |           |
| 27        | 5           | Spare                                                 | Spare                                                       | N/A                         | N/A                                                                        |           |
| 32        | 6           | LW ImplsNoiseCnt(Spare)                               | Impulse Noise Count(Spare)                                  | N/A                         | N/A                                                                        |           |
| 38        | 10          | LW ImplsNoiseCnt(Num impulses detected)               | Impulse Noise Count(Num impulses detected)                  | N/A                         | N/A                                                                        |           |
| 64        | 6           | LW ZPDAmpChan(Spare)                                  | ZPD Amplitude Channel(Spare)                                | N/A                         | N/A                                                                        |           |
| 70        | 10          | LW ZPDAmpChan(ZPD Amp bits 4-13 of A/D)               | ZPD Amp (Bits 4-13 of the A/D Converter)                    | N/A                         | -, -, -, 16,0                                                              |           |
| 48        | 16          | LW_ZPDLocChan(ZPD Loc)                                | ZPD Location Channel(ZPD Location)                          | N/A                         | N/A                                                                        |           |
| 80        | 16          | LW_NumConvPulse(Total num Interf Conv Pulses<br>Rcv)  | Num Interferometer Convert Pulses Recv                      | N/A                         | N/A                                                                        |           |
| 96        | 5           | LW FilterStatUpperReg(Not Used1)                      | Filter Status Upper Reg.(Not Used1)                         | N/A                         | N/A                                                                        |           |
| 101       | 1           | LW_FilterStatUpperReg(Num Output Filter Smple<br>err) | Filter Status Upper Reg (Number Output Filter Sample Error) | 0                           | False<br>True                                                              |           |
| 102       | 1           | LW FilterStatUpperReg(Not Used2)                      | Filter Status Upper Reg. (Not Used2)                        | N/A                         | N/A                                                                        |           |
| 103       | 1           | LW FilterStatUpperReg(Busy TO AD#9)                   | Filter Status Upper Reg (Busy TO AD#9)                      | 0                           | No Timeout<br>Timeout                                                      |           |
| 104       | 1           | LW/ EilterStatl InnerReg(Rusy TO AD#8)                | Filter Status Upper Reg (Busy TO AD#8)                      | 0                           | No Timeout<br>Timeout                                                      |           |
| 105       | 1           | LW/ EiterStatl InnerReg(Rusy TO AD#7)                 | Filter Status Upper Reg (Busy TO AD#7)                      | 0                           | No Timeout                                                                 |           |
| 105       | 1           | LW/ FilterStatl InperReg(Busy TO AD#r)                | Filter Status Upper Reg. (Busy TO AD#7)                     | 0                           | No Timeout                                                                 |           |
| 107       | 1           | LW FilterStatUpperReg(Busy TO AD#5)                   | Filter Status Upper Reg (Busy TO AD#5)                      | 0                           | No Timeout                                                                 |           |

## Table 4.2.9 CrIS Diagnostic Interferogram Packet User Data Fields

| Table 4.2.9 Cris Diagnostic Interferogram Packet User Data Fields (cont) |
|--------------------------------------------------------------------------|
|--------------------------------------------------------------------------|

|           |        |                                                 |                                                                       |             | A                                                      |           |
|-----------|--------|-------------------------------------------------|-----------------------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
|           | Bit    |                                                 |                                                                       | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
| Start Bit | Size   | Mnemonic Name                                   | Description                                                           | or          | or                                                     | Data Type |
|           |        |                                                 |                                                                       | State Value | State Name                                             |           |
|           |        |                                                 |                                                                       | 0           | No Timeout                                             |           |
| 108       | 1      | LW_FilterStatUpperReg(Busy TO AD#4)             | Filter Status Upper Reg.(Busy TO AD#4)                                | 1           | Timeout                                                |           |
| 100       | 1      | LVM FilterStatilinnerBeg(Buey TO AD#2)          | Filter Status Upper Bog (Buoy TO AD#2)                                | 0           | No limeout                                             |           |
| 109       |        | EW_FilterStatOpperKeg(Busy TO AD#3)             | Filler Status Opper Reg. (Busy TO AD#3)                               | 0           | No Timeout                                             |           |
| 110       | 1      | LW FilterStatUpperReg(Busy TO AD#2)             | Filter Status Upper Reg. (Busy TO AD#2)                               | 1           | Timeout                                                |           |
|           |        |                                                 | · ····································                                | 0           | No Timeout                                             |           |
| 111       | 1      | LW_FilterStatUpperReg(Busy TO AD#1)             | Filter Status Upper Reg.(Busy TO AD#1)                                | 1           | Timeout                                                |           |
| 110       | 2      | 1)// FilterCtetl averBer (FID Devision Dev)     | Filher Status Laura Day (FID Davisian Day )                           | NVA         | N/A                                                    |           |
| 112       | 3      | LVV_FILTErStatLowerReg(FIR Revision Reg)        | Filler Status Lower Reg.(FIR Revision Reg.)                           | N/A         | N/A<br>Bank 1                                          |           |
| 115       | 1      | IW FilterStatLowerReg(Sys Proc Lst Bnk Filled)) | Filter Status Lower Reg (System Processor Last Bank Filled)           | 1           | Bank 2                                                 |           |
|           |        |                                                 |                                                                       |             |                                                        |           |
| 116       | 1      | LW_FilterStatLowerReg(Reserved)                 | Filter Status Lower Reg.(Reserved)                                    | N/A         | N/A                                                    |           |
|           |        |                                                 |                                                                       | 24          | channel 1                                              |           |
|           |        |                                                 |                                                                       | 25          | channel 2                                              |           |
|           |        |                                                 |                                                                       | 26          | channel 3                                              |           |
|           |        |                                                 |                                                                       | 27          | channel 4                                              |           |
|           |        |                                                 |                                                                       | 20          | channel 5                                              |           |
|           |        |                                                 |                                                                       | 21          | channel 6                                              |           |
|           |        |                                                 |                                                                       | 22          | channel 7                                              |           |
|           |        |                                                 |                                                                       | 23          | channel 8                                              |           |
|           |        |                                                 |                                                                       | 12          | channel 9                                              |           |
|           |        |                                                 |                                                                       | 13-15       | Not Used                                               |           |
| 117       | 5      | LW_FilterStatLowerReg(Diag Mode Chan Sel)       | Filter Status Lower Reg.(Diag Mode Chan. Select)                      | All Others  | invalid                                                |           |
|           |        |                                                 |                                                                       | 0           | Disabled                                               |           |
| 122       | 1      | LW_FilterStatLowerReg(Diag Mode En/Disable)     | Filter Status Lower Reg (Diag Mode Enable/Disable)                    | 1           | Enabled                                                |           |
|           |        |                                                 |                                                                       | 0           | Disabled                                               |           |
| 123       | 1      | LW_FilterStatLowerReg(Byte Swap Mode)           | Filter Status Lower Reg.(Byte Swap Mode)                              | 1           | Enabled                                                |           |
| 124       | 1      | LVV_FliterStatLowerReg(Num of Sample Pulse      | Filter Status Lower Reg (Number Sample Pulse Error)                   | 1           | Faise                                                  |           |
| 127       |        | Eny                                             |                                                                       | 0           | False                                                  |           |
| 125       | 1      | LW FilterStatLowerReg(Coef Set 2 Chksum Err)    | Filter Status Lower Reg.(Coef Set 2 Checksum Error)                   | 1           | True                                                   |           |
|           |        |                                                 |                                                                       | 0           | False                                                  |           |
| 126       | 1      | LW_FilterStatLowerReg(Coef Set 1 Chksum Err)    | Filter Status Lower Reg.(Coef Set 1 Checksum Error)                   | 1           | True                                                   |           |
|           |        |                                                 |                                                                       | 0           | No Impulse                                             |           |
| 127       | 1      | LW_FilterStatLowerReg(Impul Msk Err)            | Filter Status Lower Reg.(Impulse Mask Error)                          | 1           | Impulse Detected                                       |           |
| 100       | Varias | LW/ DIA DetectorDate                            | Discussion Database Data Dit Trimmand Interferences Data (I) 1at Mard | NIZA        | N/A                                                    |           |
| 120       | varies | LW_DIA_DelectorData                             | Diagnostic Detector Databit minimed interierogram Data (1) 1st word   | N/A         | N/A                                                    |           |
| varies    | varies | LW DIA DetectorData                             | Diagnostic Detector DataBit Trimmed Interferogram Data (I) Last Word  | N/A         | N/A                                                    |           |
|           |        |                                                 |                                                                       |             |                                                        |           |
| varies    | varies | LW_DIA_DetectorData                             | Diagnostic Detector DataBit Trimmed Interferogram Data (Q) 1st Word   | N/A         | N/A                                                    |           |
| varies    | varies | LW_DIA_DetectorData                             | Diagnostic Detector DataBit Trimmed Interferogram Data (Q) Last Word  | N/A         | N/A                                                    |           |
|           |        | PRATIC                                          |                                                                       |             |                                                        |           |

## 4.2.4.5 Dwell Data

Three types of dwell packets are commandable from the CrIS sensor in Diagnostic mode. All three types of packets are generated at every scan epoch (40 times per 8 second scan).

## 4.2.4.5.1 IM Telemetry Dwell

The Interferometer Module Telemetry Dwell provides fast sampling of seven selectable channels within the IM. Each channel is sampled 80 times with a single epoch. The Jists t CrIS outputs APID 1293 forty times per 8 second scan. The packet length is fixed at 1150 octets. Figure 4.2-13 displays the packet structure. Table 4.2.10 lists the contents

#### VERSION B DATE **CrIS IM Telemetry Dwell Packet** SECONDAR User Data Field PACKET PRIMARY HEADER HEADER Verson N Packet Identification Packet Sequence Packet CrIS IM Telemetry Dwell Length Sec Hdr APID Sequence Sequence Start o PCE App nstrumer hannel Channel 1-7, Samples 2-80 Spare IM Status IM Error Туре Dwell Indicato Flag Flags Count Scan FSW ID Channel 7, Sample Flags Flags Version Address 1 1 OTAL 9200 Bit 14 16 64 64 8848 16 16 16 1150 1106 Octet 8 8 14 2 2 2 varies varies Valu 000 0x50D varies 0x0477 varies varies varies varies varies varies varies Secondary Header Presen Telemetry Packet

## Figure 4.2-13 CrIS IM Telemetry Dwell Packet Format

| I I       |      |                    |                                   | Units       | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
|-----------|------|--------------------|-----------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit  | Mnemonic Name      | Description                       | or          | OR                                                     | Data Type |
|           | Size |                    |                                   | State Value | State Name                                             |           |
|           | 11   |                    | DCE Application ESIM Version      | NI/A        | Ν/Α                                                    |           |
| 11        | 5    |                    |                                   | N/A         | N/A                                                    |           |
| 16        | 8    | IFM_DwellChanAddr2 | IFM Dwell Channel Address 2       | N/A         | N/A                                                    |           |
| 24        | 8    | IFM DwellChanAddr1 | IFM Dwell Channel Address 1       | N/A         | N/A                                                    | - ŭ       |
| 32        | 8    | IFM DwellChanAddr4 | IFM Dwell Channel Address 4       | N/A         | N/A                                                    | Ŭ         |
| 40        | 8    | IFM DwellChanAddr3 | IFM Dwell Channel Address 3       | N/A         | N/A                                                    | Ŭ         |
| 48        | 8    | IFM DwellChanAddr6 | IFM Dwell Channel Address 6       | N/A         | N/A                                                    | Ŭ         |
| 56        | 8    | IFM DwellChanAddr5 | IFM Dwell Channel Address 5       | N/A         | N/A                                                    | Ū         |
| 64        | 8    | IFM Spare1         | Spare                             | N/A         | N/A                                                    | Ū         |
| 72        | 8    | IFM DwellChanAddr7 | IFM Dwell Channel Address 7       | N/A         | N/A                                                    | Ū         |
| 80        | 112  | IFM Chan#Sample1   | Sample 1 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 192       | 112  | IFM Chan#Sample2   | Sample 2 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 304       | 112  | IFM Chan#Sample3   | Sample 3 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 416       | 112  | IFM Chan#Sample4   | Sample 4 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 528       | 112  | IFM_Chan#Sample5   | Sample 5 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 640       | 112  | IFM_Chan#Sample6   | Sample 6 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 752       | 112  | IFM_Chan#Sample7   | Sample 7 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 864       | 112  | IFM_Chan#Sample8   | Sample 8 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 976       | 112  | IFM_Chan#Sample9   | Sample 9 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 1088      | 112  | IFM_Chan#Sample10  | Sample 10 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1200      | 112  | IFM_Chan#Sample11  | Sample 11 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1312      | 112  | IFM_Chan#Sample12  | Sample 12 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1424      | 112  | IFM_Chan#Sample13  | Sample 13 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1536      | 112  | IFM_Chan#Sample14  | Sample 14 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1648      | 112  | IFM_Chan#Sample15  | Sample 15 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1760      | 112  | IFM_Chan#Sample16  | Sample 16 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1872      | 112  | IFM_Chan#Sample17  | Sample 17 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1984      | 112  | IFM_Chan#Sample18  | Sample 18 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2096      | 112  | IFM_Chan#Sample19  | Sample 19 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2208      | 112  | IFM_Chan#Sample20  | Sample 20 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2320      | 112  | IFM_Chan#Sample21  | Sample 21 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2432      | 112  | IFM_Chan#Sample22  | Sample 22 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2544      | 112  | IFM_Chan#Sample23  | Sample 23 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2656      | 112  | IFM_Chan#Sample24  | Sample 24 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2768      | 112  | IFM_Chan#Sample25  | Sample 25 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2880      | 112  | IFM_Chan#Sample26  | Sample 26 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2992      | 112  | IFM_Chan#Sample27  | Sample 27 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3104      | 112  | IFM_Chan#Sample28  | Sample 28 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3216      | 112  | IFM_Chan#Sample29  | Sample 29 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3328      | 112  | IFM_Chan#Sample30  | Sample 30 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2440      | 112  | IFM_Chan#Sample31  | Sample 31 from Channels # 1 to #7 | N/A         | N/A                                                    |           |
| 3440      | 440  |                    |                                   | N1/A        | N/A                                                    | - II      |

| Start Bit |      |                     |                                   |             |                                                        |           |
|-----------|------|---------------------|-----------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Dia. |                     |                                   | Units       | Conversion Coefficients (formula or C5,C4,C3.C2,C1,C0) |           |
|           | Bit  | Mnemonic Name       | Description                       | or          | OR                                                     | Data Type |
|           | Size |                     | ·                                 | State Value | State Name                                             |           |
| 3664      | 112  | IFM Chan#Sample33   | Sample 33 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3776      | 112  | IFM Chan#Sample34   | Sample 34 from Channels # 1 to #7 | N/A         | N/A                                                    | Ū         |
| 3888      | 112  | IFM Chan#Sample35   | Sample 35 from Channels # 1 to #7 | N/A         | N/A                                                    | Ū         |
| 4000      | 112  | IFM Chan#Sample36   | Sample 36 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4112      | 112  | IFM Chan#Sample37   | Sample 37 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4224      | 112  | IFM Chan#Sample38   | Sample 38 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4336      | 112  | IFM_Chan#Sample39   | Sample 39 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4448      | 112  | IFM_Chan#Sample40   | Sample 40 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4560      | 112  | IFM_Chan#Sample41   | Sample 41 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4672      | 112  | IFM_Chan#Sample42   | Sample 42 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4784      | 112  | IFM_Chan#Sample43   | Sample 43 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 4896      | 112  | IFM_Chan#Sample44   | Sample 44 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5008      | 112  | IFM_Chan#Sample45   | Sample 45 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5120      | 112  | IFM_Chan#Sample46   | Sample 46 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5232      | 112  | IFM_Chan#Sample47   | Sample 47 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5344      | 112  | IFM_Chan#Sample48   | Sample 48 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5456      | 112  | IFM_Chan#Sample49   | Sample 49 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5568      | 112  | IFM_Chan#Sample50   | Sample 50 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5680      | 112  | IFM_Chan#Sample51   | Sample 51 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5792      | 112  | IFM_Chan#Sample52   | Sample 52 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 5904      | 112  | IFM_Chan#Sample53   | Sample 53 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6016      | 112  | IFM_Chan#Sample54   | Sample 54 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6128      | 112  | IFM_Chan#Sample55   | Sample 55 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6240      | 112  | IFM_Chan#Sample56   | Sample 56 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6352      | 112  | IFM_Chan#Sample57   | Sample 57 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6464      | 112  | IFM_Chan#Sample58   | Sample 58 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6576      | 112  | IFM_Chan#Sample59   | Sample 59 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6688      | 112  | IFM_Chan#Sample60   | Sample 60 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 6800      | 112  | IFM_Chan#Sample61   | Sample 61 from Channels # 1 to #7 | N/A         | N/A                                                    | <u> </u>  |
| 6912      | 112  | IFM_Chan#Sample62   | Sample 62 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 7024      | 112  | IFM_Chan#Sample63   | Sample 63 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 7136      | 112  | IFM_Chan#Sample64   | Sample 64 from Channels # 1 to #7 | N/A         | N/A                                                    | 0         |
| 7248      | 112  | IFM_Chan#Sample65   | Sample 65 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 7360      | 112  | IFM_Chan#Sample66   | Sample 66 from Channels # 1 to #7 | N/A         | N/A                                                    | 0         |
| 7504      | 112  | IFM_Chan#Sample67   | Sample 67 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 7584      | 112  | IFM_Chan#Sample68   | Sample 68 from Channels # 1 to #7 | N/A         | N/A                                                    | <u>U</u>  |
| 7696      | 112  | IFM_Chan#Sample69   | Sample 69 from Channels # 1 to #7 | N/A         | N/A                                                    | <u>U</u>  |
| 7808      | 112  | IFM_Chan#Sample70   | Sample 70 from Channels # 1 to #7 | N/A         | N/A                                                    | <u>U</u>  |
| 7920      | 112  | IFM_Chan#Sample71   | Sample 71 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 8032      | 112  | IFM_Chan#Sample72   | Sample 72 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 8256      | 112  | IFM_Chan#Sample73   | Sample 73 from Channels # 1 to #7 | N/A<br>N/A  | Ν/Α<br>Ν/Δ                                             |           |
| 8256      | 112  | IFM_Chan#Sample74   | Sample 74 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 0250      | 112  | II M_Chall#Sample/4 | Sample 74 nom Channels # 1 to #7  | 11/1        | N/A                                                    |           |

| Table 4.2.10 Cho in relementy Dwen Packet User Data Fields (Cont) |
|-------------------------------------------------------------------|
|-------------------------------------------------------------------|

| C5,C4,C3,C2,C1,C0) | Conversion Coefficients (formula or C5,C4,C3,C    | Units          |                                                     |                                                 | D:4  | 7         |
|--------------------|---------------------------------------------------|----------------|-----------------------------------------------------|-------------------------------------------------|------|-----------|
| Data Tyr           | OR                                                | or             | Description                                         | Mnemonic Name                                   | Bit  | Start Bit |
|                    | State Name                                        | State Value    |                                                     |                                                 | Size |           |
| U                  | N/A                                               | N/A            | Sample 75 from Channels # 1 to #7                   | IFM Chan#Sample75                               | 112  | 8368      |
|                    | N/A                                               | N/A            | Sample 76 from Channels # 1 to #7                   | IFM Chan#Sample76                               | 112  | 8480      |
| ū                  | N/A                                               | N/A            | Sample 77 from Channels # 1 to #7                   | IFM Chan#Sample77                               | 112  | 8592      |
| Ū                  | N/A                                               | N/A            | Sample 78 from Channels # 1 to #7                   | IFM Chan#Sample78                               | 112  | 8704      |
| Ū                  | N/A                                               | N/A            | Sample 79 from Channels # 1 to #7                   | IFM Chan#Sample79                               | 112  | 8816      |
| Ū                  | N/A                                               | N/A            | Sample 80 from Channels # 1 to #7                   | IFM Chan#Sample80                               | 112  | 8928      |
| U                  | N/A                                               | N/A            | Spare                                               | IFM Spare2                                      | 16   | 9040      |
| U                  | N/A                                               | N/A            | IFM Status Flags(spare2)                            | IFM StatFlags(spare2)                           | 5    | 9056      |
|                    | Standby                                           | 0              |                                                     |                                                 |      |           |
|                    | Nominal                                           | 1              |                                                     |                                                 |      |           |
|                    | EEPROM                                            | 2              |                                                     |                                                 |      |           |
| U                  | Invalid                                           | 3              | IFM Status Flag(IFM Mode Status)                    | IFM StatFlag(Infer Mode Stat)                   | 2    | 9061      |
| U                  |                                                   |                | IFM Status Flags(spare1)                            | IFM StatFlags(spare1)                           | 1    | 9063      |
|                    | reverse direction                                 | - 0            | ······································              |                                                 |      |           |
| u U                | forward direction                                 |                | IFM Status Flags(Porchswing Sweep Direction)        | IEM_StatElags(Porchswing Sweep Dir)             | 1    | 9064      |
|                    | Position Error                                    | - i            |                                                     |                                                 |      |           |
| d U                | Sweens Synced                                     | 1 I            | IEM Status Elag(Porchswing Sween Lock)              | IEM_StatElag(Porchswing Sween Lock)             | 1    | 9065      |
| ed                 | No Sync Received                                  | i i            | in in ordered in log(in ordered in ing outdop 2008) |                                                 |      |           |
| 4 11               | Sync Received                                     | 1              | IEM Status Elags(Loss PCE Frame Sync Pulse)         | IEM_StatElags(Loss PCE Frame Sync Pulse Stat)   | 1    | 9066      |
| ed                 | No Limit Reached                                  |                |                                                     |                                                 |      | 0000      |
| 1                  | Limit Reached                                     | 1              | IEM Status Elage/Porchewing MPD Switch Status)      | IEM StatElage(Porchewing MPD Switch Stat)       | 1    | 9067      |
|                    | Away from BmSp                                    |                |                                                     | In M_Stati lags(i Stellswillg Mi D Switch Stat) |      | 3007      |
|                    | Towards BmSP                                      | 1              | IEM Status Elace/Parchewing 7PD Switch Status)      | IEM StatElags/Porchswing ZPD Switch Stat)       | 1    | 0068      |
| - 0                |                                                   |                | IFWI Status Flags(Forchswing ZFD Switch Status)     | IFIM_StatFlags(FOICHSWING ZFD SWItch Stat)      |      | 9000      |
|                    | On                                                | 1              | IEM Status Elags(DA Satus)                          | IEM StatElage/DA Sania Status                   | 1    | 0060      |
|                    | UII<br>Dhaaa Uirlaskad                            |                | IFINI Status Flags(DA Servo Status)                 | IFINI_StatFlags(DA Servo Status                 |      | 9009      |
|                    | Phase Uniocked                                    | 1              | IEM Status Flags(DA V carva lacked)                 | IEM StatElage(DA Vicence looked)                | 4    | 0070      |
| U                  | Phase Locked                                      |                | IFINI Status Flags(DA-Y servo locked)               | IFIVI_StatFlags(DA-Y servo locked)              |      | 9070      |
|                    | Phase Uniocked                                    | 0              | IEM Obstan Electric (D.A. V. server La dava)        | IEM ObstEless (DA Vissers laster)               |      | 0074      |
|                    | Phase Locked                                      |                | IFM Status Flags(DA-X servo locked)                 | IFIN_StatFlags(DA-X servo locked)               | 10   | 9071      |
| 0                  | N/A                                               | N/A            | IFM Error Flags(Spare)                              | IFM_ErrFlags(Spare)                             | 12   | 9072      |
|                    | Invalid                                           | 0              |                                                     |                                                 |      | 0004      |
| 0                  | Valid                                             |                | IFM Error Flags(Tim Validity)                       | IFINI_ErrFlags(Tele Validity)                   | 1    | 9084      |
|                    | False                                             | 0              |                                                     |                                                 |      | 0005      |
| 0                  | Irue                                              | 1              | IFM Error Flags(Cmd Processor Error)                | IFM_ErrFlags(Cmd Proc Err)                      | 1    | 9085      |
|                    | No Error                                          | 00             |                                                     |                                                 |      |           |
|                    | CRC Error                                         | 01             |                                                     |                                                 |      |           |
| mat                | Invalid Packet Format                             | 10             |                                                     |                                                 |      |           |
| rd U               | Invalid Cmd Word                                  | 11             | IFM Error Flags(Packet Reception Error)             | IFM_ErrFlags(Packet Reception Err)              | 2    | 9086      |
|                    |                                                   |                | allo br                                             |                                                 |      |           |
|                    |                                                   |                |                                                     | N.                                              |      |           |
|                    | CRC Error<br>Invalid Packet For<br>Invalid Cmd Wo | 01<br>10<br>11 | IFM Error Flags(Packet Reception Error)             | IFM_ErrFlags(Packet Reception Err)              | 2    | 9086      |

#### 4.2.4.5.2 HK Telemetry Dwell

The Housekeeping Telemetry Dwell provides fast sampling of six selected housekeeping telemetry points. Each selection is sampled 80 times with a single epoch. The CrIS outputs APID 1291 forty times per 8 second scan. The packet length is fixed at 988 octets. Figure 4.2-14 displays the packet structure. Table 4.2.11 lists the contents of the User Data Field.

|    |            |                   | PACKE           | T PRIMARY I | IEADER                     |                   |        | SECONDARY        |                           |                  | Us                                      | er Data Fi                     | eld                                   |
|----|------------|-------------------|-----------------|-------------|----------------------------|-------------------|--------|------------------|---------------------------|------------------|-----------------------------------------|--------------------------------|---------------------------------------|
| 7  | Verson No. | Packet            | : Identific     | cation      | Packet :                   | Sequence          | Packet | HEADER           |                           |                  | CrIS IM '                               | Felemetry                      | Dwell Data                            |
|    |            | Type<br>Indicator | Sec Hdr<br>Flag | APID        | Sequence<br>Flags          | Sequence<br>Count | Length | Start of<br>Scan | PCE App<br>FSW<br>Version | Instrument<br>ID | Dwell<br>Channel<br>Address 1-<br>3,5-7 | Channels<br>3,5-7,<br>Sample 1 | 1 Channels 1-3 and 5-7, Samples<br>80 |
| ts | 3          | 1                 | 1               | 11          | 2                          | 14                | 16     | 64               | 11                        | 5                | 96                                      | 96                             | 7584                                  |
| ts |            | 2                 |                 |             |                            | 2                 | 2      | 8                |                           | 2                | 12                                      | 12                             | 948                                   |
| ue | 000        | , 0               | 1 、             | 0x50B       | 11                         | varies            | 0x03D5 | varies           | varies                    | varies           | varies                                  | varies                         | varies                                |
|    |            | Telem             | etry Packet     |             | econdary<br>leader Present | t                 |        |                  | Oper                      |                  |                                         |                                |                                       |

Figure 4.2-14 CrIS Housekeeping Telemetry Dwell Packet Format

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|           | Bit  |                   |                                                       | Units             | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
|-----------|------|-------------------|-------------------------------------------------------|-------------------|--------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name     | Description                                           | or<br>State Value | or<br>State Name                                       | Data Type |
| 0         | 11   | HK PCEAppFSWVer   | PCE Application FSW Version                           | N/A               | N/A                                                    | U         |
| 11        | 5    | HK_InstrumentID   | Instrument ID                                         | N/A               | N/A                                                    | U         |
| 16        | 16   | HK_DwellChanAddr1 | HK Dwell Channel Address 1                            | N/A               | N/A                                                    | U         |
| 32        | 16   | HK_DwellChanAddr2 | HK Dwell Channel Address 2                            | N/A               | N/A                                                    | U         |
| 48        | 16   | HK_DwellChanAddr3 | HK Dwell Channel Address 3                            | N/A               | N/A                                                    | U         |
| 64        | 16   | HK_DwellChanAddr5 | HK Dwell Channel Address 5                            | N/A               | N/A                                                    | U         |
| 80        | 16   | HK_DwellChanAddr6 | HK Dwell Channel Address 6                            | N/A               | N/A                                                    | U         |
| 96        | 16   | HK_DwellChanAddr7 | HK Dwell Channel Address 7                            | N/A               | N/A                                                    | U         |
| 112       | 96   | HK_Chan#Sample1   | Sample 1 from Data Selection # 1 to #3 and #5 to #7   | N/A               | N/A                                                    | U         |
| 208       | 96   | HK_Chan#Sample2   | Sample 2 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 304       | 96   | HK_Chan#Sample3   | Sample 3 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 400       | 96   | HK_Chan#Sample4   | Sample 4 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 496       | 96   | HK_Chan#Sample5   | Sample 5 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 592       | 96   | HK_Chan#Sample6   | Sample 6 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 688       | 96   | HK_Chan#Sample7   | Sample 7 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 784       | 96   | HK_Chan#Sample8   | Sample 8 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 880       | 96   | HK_Chan#Sample9   | Sample 9 from Data Selection # 1 to # 3 and #5 to #7  | N/A               | N/A                                                    | U         |
| 976       | 96   | HK_Chan#Sample10  | Sample 10 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1072      | 96   | HK_Chan#Sample11  | Sample 11 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1168      | 96   | HK_Chan#Sample12  | Sample 12 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1264      | 96   | HK_Chan#Sample13  | Sample 13 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1360      | 96   | HK_Chan#Sample14  | Sample 14 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1456      | 96   | HK_Chan#Sample15  | Sample 15 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1552      | 96   | HK_Chan#Sample16  | Sample 16 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1648      | 96   | HK_Chan#Sample17  | Sample 17 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1744      | 96   | HK_Chan#Sample18  | Sample 18 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1840      | 96   | HK_Chan#Sample19  | Sample 19 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 1936      | 96   | HK_Chan#Sample20  | Sample 20 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2032      | 96   | HK_Chan#Sample21  | Sample 21 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2128      | 96   | HK_Chan#Sample22  | Sample 22 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2224      | 96   | HK_Chan#Sample23  | Sample 23 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2320      | 96   | HK_Chan#Sample24  | Sample 24 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2416      | 96   | HK_Chan#Sample25  | Sample 25 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2512      | 96   | HK_Chan#Sample26  | Sample 26 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2608      | 96   | HK_Chan#Sample27  | Sample 27 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2704      | 96   | HK_Chan#Sample28  | Sample 28 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2800      | 96   | HK_Chan#Sample29  | Sample 29 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2896      | 96   | HK_Chan#Sample30  | Sample 30 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 2992      | 96   | HK_Chan#Sample31  | Sample 31 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 3088      | 96   | HK_Chan#Sample32  | Sample 32 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 3184      | 96   | HK_Chan#Sample33  | Sample 33 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 3280      | 96   | HK_Chan#Sample34  | Sample 34 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
| 3376      | 96   | HK_Chan#Sample35  | Sample 35 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |
|           | 96   | HK Chan#Sample36  | Sample 36 from Data Selection # 1 to # 3 and #5 to #7 | N/A               | N/A                                                    | U         |

## Table 4.2.11 CrIS Housekeeping Telemetry Dwell Packet User Data Fields

| Table 4.2.11 CrIS Housekeeping | Felemetry Dwell Packet | User Data Fields (cont) |
|--------------------------------|------------------------|-------------------------|
|--------------------------------|------------------------|-------------------------|

| Start Bit                               | Bit<br>Size | Mnemonic Name    | Description                                           | Units<br>or<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or<br>State Name | Data Type  |
|-----------------------------------------|-------------|------------------|-------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|------------|
| 3568                                    | 96          | HK Chan#Sample37 | Sample 37 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 3664                                    | 96          | HK_Chan#Sample38 | Sample 38 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 3760                                    | 96          | HK_Chan#Sample39 | Sample 39 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 3856                                    | 96          | HK_Chan#Sample40 | Sample 40 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 3952                                    | 96          | HK_Chan#Sample41 | Sample 41 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4048                                    | 96          | HK_Chan#Sample42 | Sample 42 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4144                                    | 96          | HK_Chan#Sample43 | Sample 43 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4240                                    | 96          | HK_Chan#Sample44 | Sample 44 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4336                                    | 96          | HK_Chan#Sample45 | Sample 45 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4432                                    | 96          | HK_Chan#Sample46 | Sample 46 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4528                                    | 96          | HK_Chan#Sample47 | Sample 47 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4624                                    | 96          | HK_Chan#Sample48 | Sample 48 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4720                                    | 96          | HK_Chan#Sample49 | Sample 49 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4816                                    | 96          | HK_Chan#Sample50 | Sample 50 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 4912                                    | 96          | HK_Chan#Sample51 | Sample 51 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 5008                                    | 96          | HK_Chan#Sample52 | Sample 52 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 5104                                    | 96          | HK_Chan#Sample53 | Sample 53 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 5200                                    | 96          | HK_Chan#Sample54 | Sample 54 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 5296                                    | 96          | HK_Chan#Sample55 | Sample 55 from Data Selection # 1 to # 3 and #5 to #/ | N/A                        | N/A                                                                        | U          |
| 5392                                    | 96          | HK_Chan#Sample56 | Sample 56 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | <u> </u>   |
| 5488                                    | 96          | HK_Chan#Sample57 | Sample 57 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 5584                                    | 96          | HK_Chan#Sample58 | Sample 58 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | <u> </u>   |
| 5680                                    | 96          | HK_Chan#Sample59 | Sample 59 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | 0          |
| 5//6                                    | 96          | HK_Chan#Sample60 | Sample 60 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | <u> </u>   |
| 5000                                    | 96          | HK_Chan#Sample61 | Sample 61 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | <u> </u>   |
| 0900                                    | 96          | HK_Chan#Sample62 | Sample 62 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        |            |
| 6160                                    | 96          | HK_Chan#Sample63 | Sample 63 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        |            |
| 6256                                    | 90          | HK_Chan#Sample65 | Sample 65 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A N/A                                                                    |            |
| 6252                                    | 90          | HK_Chan#Sample66 | Sample 66 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A N/A                                                                    | - <u> </u> |
| 6448                                    | 96          | HK_Chan#Sample67 | Sample 67 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A<br>N/A                                                                 |            |
| 6544                                    | 96          | HK Chan#Sample68 | Sample 68 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        |            |
| 6640                                    | 96          | HK_Chan#Sample69 | Sample 69 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | - ŭ        |
| 6736                                    | 96          | HK_Chan#Sample70 | Sample 70 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | Ν/Δ                                                                        | <u> </u>   |
| 6832                                    | 96          | HK Chan#Sample71 | Sample 71 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        |            |
| 6928                                    | 96          | HK Chan#Sample72 | Sample 72 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | <u> </u>   |
| 7024                                    | 96          | HK Chan#Sample73 | Sample 73 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | - ŭ        |
| 7120                                    | 96          | HK Chan#Sample74 | Sample 74 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | ŭ          |
| 7216                                    | 96          | HK Chan#Sample75 | Sample 75 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | - ŭ        |
| 7312                                    | 96          | HK Chan#Sample76 | Sample 76 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | Ŭ          |
| 7408                                    | 96          | HK Chan#Sample77 | Sample 77 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | Ū          |
| 7504                                    | 96          | HK Chan#Sample78 | Sample 78 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | Ū          |
| ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | 06          | HK Chan#Sample79 | Sample 79 from Data Selection # 1 to # 3 and #5 to #7 | N/A                        | N/A                                                                        | U          |
| 7600                                    | 90          |                  |                                                       |                            |                                                                            |            |

#### 4.2.4.5.3 SSM Telemetry Dwell

The Scene Selection Module Telemetry Dwell provides fast sampling of seven selectable channels within the SSM. Each channel is sampled 80 times with a single epoch. The CrIS outputs APID 1292 forty times per 8 second scan. The packet length is fixed at 1150 octets. Figure 4.2-15 displays the packet structure. Table 4.2.12 lists the contents of the User Data Field.



#### Figure 4.2-15 CrIS SSM Telemetry Dwell Packet Format

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| Table 4.2.12 CH3 33W Telemetry Dwell Packet User Data Fields |
|--------------------------------------------------------------|
|--------------------------------------------------------------|

|           |      |                    |                                   | Units       | Conversion Coefficients (formula or C5.C4.C3 C2 C1 C0) |           |
|-----------|------|--------------------|-----------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit  | Mnemonic Name      | Description                       | or          | or                                                     | Data Type |
|           | 3120 |                    |                                   | State Value | State Name                                             |           |
| 0         | 11   | SSM_PCEAppFswVer   | PCE Application FSW Version       | N/A         | N/A                                                    | U         |
| 11        | 5    | SSM_InstrumentID   | Instrument ID                     | N/A         | N/A                                                    | U         |
| 16        | 8    | SSM_DwellChanAddr2 | Dwell channel address #2          | N/A         | N/A                                                    | U         |
| 24        | 8    | SSM_DwellChanAddr1 | Dwell channel address #1          | N/A         | N/A                                                    | U         |
| 32        | 8    | SSM_DwellChanAddr4 | Dwell channel address #4          | N/A         | N/A                                                    | U         |
| 40        | 8    | SSM_DwellChanAddr3 | Dwell channel address #3          | N/A         | N/A                                                    | U         |
| 48        | 8    | SSM_DwellChanAddr6 | Dwell channel address #6          | N/A         | N/A                                                    | U         |
| 56        | 8    | SSM_DwellChanAddr5 | Dwell channel address #5          | N/A         | N/A                                                    | U         |
| 64        | 8    | SSM_Spare1         | Spare                             | N/A         | N/A                                                    | U         |
| 72        | 8    | SSM_DwellChanAddr7 | Dwell channel address #7          | N/A         | N/A                                                    | U         |
| 80        | 112  | SSM_Chan#Sample1   | Sample 1 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 192       | 112  | SSM_Chan#Sample2   | Sample 2 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 304       | 112  | SSM_Chan#Sample3   | Sample 3 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 416       | 112  | SSM_Chan#Sample4   | Sample 4 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 528       | 112  | SSM_Chan#Sample5   | Sample 5 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 640       | 112  | SSM_Chan#Sample6   | Sample 6 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 752       | 112  | SSM_Chan#Sample7   | Sample 7 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 864       | 112  | SSM_Chan#Sample8   | Sample 8 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 976       | 112  | SSM_Chan#Sample9   | Sample 9 from Channels # 1 to #7  | N/A         | N/A                                                    | U         |
| 1088      | 112  | SSM_Chan#Sample10  | Sample 10 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1200      | 112  | SSM_Chan#Sample11  | Sample 11 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1312      | 112  | SSM_Chan#Sample12  | Sample 12 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1424      | 112  | SSM_Chan#Sample13  | Sample 13 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1536      | 112  | SSM_Chan#Sample14  | Sample 14 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1648      | 112  | SSM_Chan#Sample15  | Sample 15 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1760      | 112  | SSM_Chan#Sample16  | Sample 16 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1872      | 112  | SSM_Chan#Sample17  | Sample 17 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 1984      | 112  | SSM_Chan#Sample18  | Sample 18 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2096      | 112  | SSM_Chan#Sample19  | Sample 19 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2208      | 112  | SSM_Chan#Sample20  | Sample 20 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2320      | 112  | SSM_Chan#Sample21  | Sample 21 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2432      | 112  | SSM_Chan#Sample22  | Sample 22 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2544      | 112  | SSM_Chan#Sample23  | Sample 23 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2656      | 112  | SSM_Chan#Sample24  | Sample 24 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2768      | 112  | SSM_Chan#Sample25  | Sample 25 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2880      | 112  | SSM_Chan#Sample26  | Sample 26 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 2992      | 112  | SSM_Chan#Sample27  | Sample 27 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3104      | 112  | SSM_Chan#Sample28  | Sample 28 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3216      | 112  | SSM_Chan#Sample29  | Sample 29 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3328      | 112  | SSM_Chan#Sample30  | Sample 30 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3440      | 112  | SSM_Chan#Sample31  | Sample 31 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3552      | 112  | SSM_Chan#Sample32  | Sample 32 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 3664      | 112  | SSM_Chan#Sample33  | Sample 33 from Channels # 1 to #7 | N/A         | N/A                                                    | U         |
| 0004      | 112  | SSM_Chan#Sample34  | Sample 34 from Channels # 1 to #7 | NI/A        | N/A                                                    |           |

| Table 4.2.12 | CrIS SSM Telemet | rv Dwell Packet Use | r Data Fields (cont) |
|--------------|------------------|---------------------|----------------------|
|              |                  |                     | Bala Fielde (eelig   |

|      | Bit  | Mnemonic Name     | Description                       | Units<br>or | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or | Data Tvn |
|------|------|-------------------|-----------------------------------|-------------|--------------------------------------------------------------|----------|
|      | Size |                   |                                   | State Value | State Name                                                   |          |
| 3888 | 112  | SSM Chan#Sample35 | Sample 35 from Chappels # 1 to #7 | N/A         | N/A                                                          | - U      |
| 4000 | 112  | SSM_Chan#Sample36 | Sample 36 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 4112 | 112  | SSM_Chan#Sample37 | Sample 37 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 4224 | 112  | SSM_Chan#Sample38 | Sample 38 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 4336 | 112  | SSM Chan#Sample39 | Sample 39 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 4448 | 112  | SSM Chan#Sample40 | Sample 40 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 4560 | 112  | SSM Chan#Sample41 | Sample 41 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 4672 | 112  | SSM Chan#Sample42 | Sample 42 from Channels # 1 to #7 | N/A         | N/A                                                          | ŭ        |
| 4784 | 112  | SSM Chan#Sample43 | Sample 43 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 4896 | 112  | SSM Chan#Sample44 | Sample 44 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 5008 | 112  | SSM Chan#Sample45 | Sample 45 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 5120 | 112  | SSM Chan#Sample46 | Sample 46 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 5232 | 112  | SSM Chan#Sample47 | Sample 47 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 5344 | 112  | SSM Chan#Sample48 | Sample 48 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 5456 | 112  | SSM Chan#Sample49 | Sample 49 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 5568 | 112  | SSM Chan#Sample50 | Sample 50 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 5680 | 112  | SSM Chan#Sample51 | Sample 51 from Channels # 1 to #7 | N/A         | N/A                                                          | - Ŭ      |
| 5792 | 112  | SSM_Chan#Sample52 | Sample 52 from Channels # 1 to #7 | N/A         | N/A                                                          | - Ŭ      |
| 5904 | 112  | SSM Chan#Sample53 | Sample 53 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 6016 | 112  | SSM Chan#Sample54 | Sample 54 from Channels # 1 to #7 | N/A         | N/A                                                          | - Ŭ      |
| 6128 | 112  | SSM Chan#Sample55 | Sample 55 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 6240 | 112  | SSM Chan#Sample56 | Sample 56 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 6352 | 112  | SSM_Chan#Sample57 | Sample 57 from Channels # 1 to #7 | N/A         | N/A                                                          | ŭ        |
| 6464 | 112  | SSM_Chan#Sample58 | Sample 58 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 6576 | 112  | SSM_Chan#Sample59 | Sample 59 from Channels # 1 to #7 | N/A         | N/A                                                          | <u> </u> |
| 6688 | 112  | SSM Chan#Sample60 | Sample 60 from Channels # 1 to #7 | N/A         | N/A                                                          | <u> </u> |
| 6800 | 112  | SSM Chan#Sample61 | Sample 61 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 6912 | 112  | SSM Chan#Sample62 | Sample 62 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7024 | 112  | SSM_Chan#Sample63 | Sample 63 from Channels # 1 to #7 | N/A         | N/A                                                          | - ŭ      |
| 7136 | 112  | SSM Chan#Sample64 | Sample 64 from Channels # 1 to #7 | N/A         | N/A                                                          | - Ŭ      |
| 7248 | 112  | SSM Chan#Sample65 | Sample 65 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7360 | 112  | SSM Chan#Sample66 | Sample 66 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7472 | 112  | SSM Chan#Sample67 | Sample 67 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7584 | 112  | SSM Chan#Sample68 | Sample 68 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 7696 | 112  | SSM Chan#Sample69 | Sample 69 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7808 | 112  | SSM Chan#Sample70 | Sample 70 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 7920 | 112  | SSM Chan#Sample71 | Sample 71 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
| 8032 | 112  | SSM_Chan#Sample72 | Sample 72 from Channels # 1 to #7 | N/A         | N/A                                                          | - Ŭ      |
| 8144 | 112  | SSM Chan#Sample73 | Sample 73 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 8256 | 112  | SSM Chan#Sample74 | Sample 74 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 8368 | 112  | SSM Chan#Sample75 | Sample 75 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 8480 | 112  | SSM Chan#Sample76 | Sample 76 from Channels # 1 to #7 | N/A         | N/A                                                          | Ŭ        |
|      | 112  | SSM Chan#Sample77 | Sample 77 from Channels # 1 to #7 | N/A         | N/A                                                          | Ū        |
| 8592 | 110  | 0011_01-011-70    |                                   |             |                                                              |          |

| Table 4.2. 12 CIIS SSIVI TELETILELI V DWEIL FACKEL USEL DALA FIELUS (CUIIL) |
|-----------------------------------------------------------------------------|
|-----------------------------------------------------------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name                                            | Description                                               | Units<br>or<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or State Name | Data Type |
|-----------|-------------|----------------------------------------------------------|-----------------------------------------------------------|----------------------------|-------------------------------------------------------------------------|-----------|
| 8816      | 112         | SSM_Chan#Sample79                                        | Sample 79 from Channels # 1 to #7                         | N/A                        | N/A                                                                     | U         |
| 8928      | 112         | SSM_Chan#Sample80                                        | Sample 80 from Channels # 1 to #7                         | N/A                        | N/A                                                                     | U         |
| 9040      | 16          | SSM_Spare2                                               | Spare                                                     | N/A                        | N/A                                                                     | U         |
| 9056      | 1           | SSM_StatFlags(CT Over-Speed Trip)                        | SSM Status Flags(X-Track Over-Speed Trip)                 | 0                          | CT Assembly speed OK<br>CT Assembly speed Unsafe                        | U         |
| 9057      | 1           | SSM StatFlags(Spare)                                     | SSM Status Flags(Spare)                                   | N/A                        | N/A                                                                     | U         |
| 9058      | 1           | SSM_StatFlags(Redundant Drv Relay Fault)                 | SSM Status Flags(Redundant Drive Relay Fault)             | 0                          | Relays OK<br>Relay Dissconnect Failure                                  | U         |
| 9059      | 1           | SSM_StatFlags(Loss 8 Sec Sync Stat)                      | SSM Status Flags(Loss 8 Sec Sync Status)                  | 0                          | Sync OK<br>Svnc Out                                                     | U         |
| 9060      | 1           | SSM_StatFlags(IT Vel Comp Active/Idle)                   | SSM Status Flags(In-Track Velocity Compensation Act/Idle) | 0                          | Enabled<br>Disabled                                                     | U         |
| 9061      | 1           | SSM_StatFlags(CT Axis Motor Winding Temp<br>Go/No Go)    | SSM Status Flags(X-Track Axis Motor Winding Temperature)  | 0                          | Temp OK<br>Temp Not OK                                                  | U         |
| 9062      | 1           | SSM_StatFlags(IT Axis Motor Winding Temp<br>Go/No Go)    | SSM Status Flags(In-Track Axis Motor Winding Temperature) | 0                          | Temp OK<br>Temp Not OK                                                  | U         |
| 9063      | 1           | SSM_StatFlags(Primary Power Current Monitor<br>Go/No Go) | SSM Status Flags(Primary Power Current Monitor Go/NoGo)   | 0                          | Pos 28 V OK<br>Pos 28 V Not OK                                          | U         |
| 9064      | 2           | SSM_StatFlags(SSM Mode Status)                           | SSM Status Flags(SSM Mode Status)                         | 00<br>01<br>10<br>11       | Safe<br>Normal<br>EEPROM Upload<br>Scan Interrupt Mode                  | U         |
| 9066      | 1           | SSM_StatFlags(Motion Comp Active/Idle)                   | SSM Status Flags(Motion Compensation Act/Idle)            | 0                          | Enabled<br>Disabled                                                     | U         |
| 9067      | 1           | SSM_StatFlags(CT Motor Drv Overload Trip)                | SSM Status Flags(X-Track Motor Drive Overload Trip)       | 0                          | Current OK<br>Current Not OK                                            | U         |
| 9068      | 1           | SSM_StatFlags(IT Motor Drv Overload Trip)                | SSM Status Flags(In-Track Motor Drive Overload Trip)      | 0                          | Current OK<br>Current Not OK                                            | U         |
| 9069      | 1           | SSM_StatFlags(Loss 200ms Sync Stat)                      | SSM Status Flags(Loss 200ms Sync Status)                  | 0                          | Sync OK<br>Sync Out                                                     | U         |
| 9070      | 1           | SSM_StatFlags(Motor Drvs On/Off)                         | SSM Status Flags(Motor Drives On/Off)                     | 0<br>1                     | On<br>Off                                                               | U         |
| 9071      | 1           | SSM_StatFlags(CT Encoder Stat)                           | SSM Status Flags(X-Track Encoder Status)                  | 0                          | Pulse Found<br>No Pulse Found                                           | U         |
| 9072      | 12          | SSM ErrFlags(Spare)                                      | SSM Error Flags(Spare)                                    | N/A                        | N/A                                                                     | U         |
| 9084      | 1           | SSM_ErrFlags(Tele Validity)                              | SSM Error Flags(TIm Validity)                             | 0                          | Invalid<br>Valid                                                        | U         |
| 9085      | 1           | SSM_ErrFlags(Cmd Proc Err)                               | SSM Error Flags(Cmd Processor Error)                      | 0                          | False<br>True                                                           | U         |
| 9086      | 2           | SSM_ErrFlags(Packet Reception Err)                       | SSM Error Flags(Packet Reception Error)                   | 00<br>01<br>10<br>11       | No Error<br>CRC Error<br>Invalid Packet Format<br>Invalid Cmd Word      | U         |
|           |             | <b>BANK</b>                                              |                                                           |                            |                                                                         |           |

## 4.2.4.6 Memory Dump

The Memory Dump Packet (APID 1397) is initiated in response to a dump command. (Note: the instrument must be in safe mode before data can be dumped.) If the requested size of memory to dump is too large for the intended peak throughput of a single packet of (32768 bytes), then it will be sent in multiple packets at 200ms increments. The Secondary Header timestamps increase in multiple-packet dumps since each packet is stamped with the time of its generation. Dumps of the SSM and IM EEPROM are limited in size to 128 bytes; multiple requests are necessary for larger dumps. The following types of memory dumps may be requested:

- IFC SRAM •
- Boot ROM
- Program EEPROM •
- BAE PCI Bridge Chip •
- Aux Bridge Chip •
- Housekeeping CCA ٠
- Signal Processor LW
- Signal Processor MW •
- Signal Processor SW ٠
- Firewire CCA A
- Firewire CCA B
- APID Table
- SSM EEPROM •
- IM EEPROM

BHICHOIN

• 1394 Fault Log

All memory dumps that include SRAM DMA buffers will contain 0xCC where the DMA buffer memory would be. If the memory type dumped is anything other than SRAM, Boot ROM, Program EEPROM or SSM/IM EEPROM, then the Start Address and Data Size fields are irrelevant and the memory dump packet is filled with static, predefined information for each module. The contents of the memory dump packet under these conditions are defined in the Appendix.

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#### VERSION B DATE **CrIS Memory Dump Packet** SECONDAR User Data Field PACKET PRIMARY HEADER HEADER Verson No Packet Identification Packet Sequence Packet CrIS Memory Dump Packet Data Length Туре Sec Hdr APID Sequence Sequence Start of PCE App Instrumer Not Used Memory Memory Memory Memory Memory Dump Data Indicato Flag Flags Count Scan FSW ID ump Type Dump Dump Dump Version Sequenc equenc Address ID Total TOTAL 262336 Bit 14 16 64 8 8 32 262144 up to 8 up to 32792 Octet 2 8 1 1 1 1 4 up to 32768 up to varies varies zeros Valu 000 0x575 varies varies varies varies varies varies varies varies Secondary Header Present Telemetry Packet

## Figure 4.2-16 CrIS Memory Dump Packet Format

## Table 4.2.13 CrIS Memory Dump Packet User Data Fields

| Start Bit | Bit Mnemonic Name |                         | Description                        | Units<br>or<br>State Value                                              | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>or State Name                                                                                                                                                         | Data Type |
|-----------|-------------------|-------------------------|------------------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 11                | MemoryDump_PCEAppFswVer | PCE App FSW Version                | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
| 11        | 5                 | MemoryDump_InstrumentID | Instrument ID                      | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
| 16        | 8                 | MemoryDump_Spare        | Spare                              | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
|           |                   |                         | A TO BUILSON .                     | 1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14 | Boot RAM<br>Boot RAM<br>Program EEPROM<br>BAE PCI Bridge Chip<br>Aux Bridge Chip<br>Housekeeping CCA<br>Signal Processor LW<br>Signal Processor SW<br>Firewire CCA A<br>Firewire CCA B<br>APID Table<br>SSM EEPROM<br>IM FEPROM |           |
| 24        | 8                 | MemoryDump_Type         | Memory dump type                   | 15                                                                      | 1394 Fault Log                                                                                                                                                                                                                  | U         |
| 32        | 8                 | MemoryDump_SeqID        | Memory dump sequence ID            | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
| 40        | 8                 | MemoryDump_SeqTotal     | Memory dump sequence total         | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
| 48        | 32                | MemoryDump_Address      | Memory dump address                | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |
| 80        | up to<br>262144   | N/A                     | Memory dump data (up to 32K Bytes) | N/A                                                                     | N/A                                                                                                                                                                                                                             | U         |

#### 4.2.4.7 Test Packet

When commanded, CrIS will generate one fixed Test packet every scan until disabled by command. The Test packet consists of a packet primary header with APID 1398, a secondary header, two octets of CrIS flight software version number and instrument identification number and a fixed data pattern of 240 'CC' hex characters for a total of 256 bytes. Figure 4.2-17 shows the format of the CrIS Test Packet.

|        | PACKET PRIMARY HEADER |            |              |        |                     |          | SECONDARY User Data Field |               |         | Data Field |                        |       |
|--------|-----------------------|------------|--------------|--------|---------------------|----------|---------------------------|---------------|---------|------------|------------------------|-------|
|        | Verson                | Packe      | t Identifi   | cation | Packet S            | Sequence | Packet                    | HEADER        | PCE App | Instrument | Repeating Test Pattern |       |
|        | No.                   | Туре       | Sec Hdr      | APID   | Sequence            | Sequence | Length                    | Start of Scan | FSW     | ID         |                        |       |
|        |                       | Indicator  | Flag         |        | Flags               | Count    |                           |               | Version |            |                        | TOTAL |
| Bits   | 3                     | 1          | 1            | 11     | 2                   | 14       | 16                        | 64            | 11      | 5          | 1920                   | 2048  |
| Octets |                       |            | 2            |        |                     | 2        | 2                         | 8             |         | 2          | 240                    | 256   |
| Value  | 000                   | <b>、</b> 0 | 1            | 0x576  | 11                  | varies   | 0x00F9                    | varies        | varies  | varies     | 0xCCCC                 |       |
|        |                       | Telen      | netry Packet |        | Secondary<br>Header | ]        |                           | TRAK.         |         |            |                        | _     |

Figure 4.2-17 CrIS Test Packet Format

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Present

## 4.3 **OMPS**

#### 4.3.4 Introduction

The Ozone Mapping and Profiler Suite (OMPS) provides NPP users with data products describing the vertical, horizontal and temporal distribution of ozone in the Earth's atmosphere. Two sensors -- one nadir viewing and one limb viewing -- observe ultraviolet and visible light from 250 nm to 1000 nm. Unlike the other NPP sensors, the OMPS does not scan across nadir. Its nadir instrument has a fixed field of view 110° x 0.3° centered at nadir. The limb-viewing instrument has three fixed fields of view directed in the anti-velocity direction. Charge-coupled devices (CCDs) within the sensors integrate the spectral and spatial distribution of radiation from 250 nm to 1000 nm.

Mission data obtained from the OMPS produce the following NPP/NPOESS EDR:

Ozone Total Column and Vertical Profile

The following VIIRS and CrIS EDRs are used in generating the OMPS EDRs:

- Temperature Profile (CrIS)
- Pressure Profile (CrIS)
- Cloud Top Pressure (VIIRS)
- Cloud Cover/Layers (VIIRS)
- Snow Cover/Depth (VIIRS)
- Fresh Water Ice (VIIRS)

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Figure 4.3-1 OMPS NPP Flight Configuration

## 4.3.5 Instrument Function

The OMPS hardware segment consists of the Limb Sensor, Nadir Sensor, and Main Electronics Boxes (MEB). A block diagram of the OMPS Flight Hardware segment is seen in Figure 4.3-1.

The Nadir Sensor contains two spectrometers to determine the total column ozone and ozone profile concentrations. The two spectrometers share a common telescope that has a 110 deg x 0.3 deg field-of-view. The total ozone spectrometer uses the full FOV of the telescope and the ozone profile spectrometer uses only a portion of the telescopes FOV.

The Limb Sensor contains a single spectrometer and telescope for determining ozone profiles of higher resolution than the Nadir Sensor. The Limb spectrometer uses three slits so that 3 ozone profiles spaced 250 km apart can be determined.

Each spectrometer uses a 364 x 780 pixel CCD to obtain the ozone data. Only a portion of each CCD is transmitted in the science and the calibration packets. Thermal Electric Coolers (TECs) and heaters maintain the CCDs at a stable temperature.

The CCD integration times and the charge transfer from the CCD to the Analog-to-Digital Converter (ADC) are controlled using a Timing Pattern Generator (TPG). Each OMPS Sensor has its own dedicated TPG. Integration times, pixel binning, and pixel sampling on the TPG are programmable. Programs for the TPGs are resident in the MEB static memory and are downloaded to the TPGs after Flight Software has been commanded to do so. Multiple TPG programs can be resident in the MEB to allow for multiple in-flight CCD operational modes.

Both the Limb Sensor and the Nadir sensor have calibration lamps and calibration mechanisms. The nadir sensor calibration mechanism can move one of two reflective diffusers into the OMPS FOV to measure solar irradiance. Likewise, the limb calibration

mechanism can move one of two transmissive diffusers into the limb FOV to measure solar irradiance. LEDs and diffusers are used to calibrate the spectrometers. The onboard LED lamps are used to check the linearity and dark current of the CCDs when the OMPS is in the shadow of the Earth with the aperture door closed.

The MEB contains the OMPS CPU, ADCs, TPGs, housekeeping and power supply boards. The MEB provides the electrical interface to the spacecraft. The housekeeping board interfaces with the Limb and Nadir Sensors and provides additional telemetry generated in the MEB itself.

## 4.3.6 Modes and Packet Structure

"Modes" are distinct, commandable states for the OMPS instrument. "Activities" are sequences of operations that are designed to be executed from a particular mode. The OMPS implements the following modes.

- OFF Mode
- SURVIVAL Mode
- BOOT Mode
- SAFE-HOLD Mode
- DECON Mode
- OPERATE Mode

The normal transition from full off to full operational mode progresses through the BOOT, SAFE-HOLD, and DECON modes, where certain early orbit checkout activities occur. The SURVIVAL MODE is used for abnormal conditions. Routine science and calibration activities are performed in the OPERATE mode, including autonomous functionality. The OMPS does not have a separate calibration mode, but performs calibrations as part of OPERATE mode as discussed below. Figure 4.3-2 is the top-level mode transition diagram for the OMPS.

Table 4.3.1 lists all the X-band unique packets output by the OMPS. These packets are output primarily in operational and diagnostic modes, though they may also be output in activation mode.

| VC | APID <sub>10</sub> | Telemetry Packet                           | Data Rat    | Data Rate (bps) |              |              | Packet              |
|----|--------------------|--------------------------------------------|-------------|-----------------|--------------|--------------|---------------------|
| U  | ID Name            |                                            | Operational | Diagnostic      | HRD          | SMD          | (octets),<br>Note 2 |
| 0  | 544                | Housekeeping,<br>Note 1                    | Note 1      | Note 1          | $\checkmark$ | $\checkmark$ | Note 1              |
| 0  | 545                | LEO&A<br>Housekeeping,<br>Note 1           | Note 1      | Note 1          | $\checkmark$ | $\checkmark$ | Note 1              |
| 13 | 546                | Test                                       |             | 409.6           |              | $\checkmark$ | 256                 |
| 21 | 549                | Dwell Telemetry                            |             | 244             |              | $\checkmark$ | 244                 |
| 0  | 550                | Diagnostic - FSW<br>Bootup Status<br>Frame | Note 1      | Note 1          | $\checkmark$ | $\checkmark$ | Note 1              |
| 21 | 556                | Table/Memory<br>Dump                       |             | Varies          |              | $\checkmark$ | <=<br>4219288       |

 Table 4.3.1 OMPS Mission Data Packet Types

| VC | APID <sub>10</sub> | Telemetry Packet Data Rate (bps)        |                | e (bps)            | Dow          | nlink        | Packet             |
|----|--------------------|-----------------------------------------|----------------|--------------------|--------------|--------------|--------------------|
| ID |                    | Name                                    | Operational    | Diagnostic         | HRD          | SMD          | Size<br>(octets)   |
|    |                    |                                         |                |                    |              |              | Note 2             |
| 11 | 560                | Nadir Total Column                      | 32198.3        |                    | $\checkmark$ | $\checkmark$ | 30138              |
|    |                    | Earth View                              |                |                    |              |              | (Note 4)           |
| 11 | 561                | Nadir Profiler Earth<br>View            | 289.3          |                    | $\checkmark$ | $\checkmark$ | 1354<br>(Note 4)   |
| 11 | 562                | Limb Profiler Long                      | 73503.1        |                    | $\checkmark$ | $\checkmark$ | 172000             |
|    |                    | Exposure Earth<br>View                  |                |                    |              |              | (Note 4)           |
| 11 | 563                | Limb Profiler Short                     | 45994.1        |                    | $\checkmark$ | <b>√</b>     | 107628             |
|    |                    | Exposure Earth<br>View                  |                |                    |              |              | (Note 4)           |
| 11 | 564                | Nadir Total Column                      | Varies         |                    | ~            |              | Varies             |
|    | 505                | Calibration RDR                         |                |                    |              |              | (Note 3)           |
| 11 | 505                | Calibration                             | varies         |                    |              | v            | (Note 3)           |
| 11 | 566                | Limb Profiler                           | Varies         | 🔺                  | $\checkmark$ | $\checkmark$ | Varies             |
|    |                    | Calibration                             |                |                    |              |              | (Note 3)           |
| 13 | 576                | Diagnostic Nadir<br>Total Column Earth  |                | 32198.3            |              | $\checkmark$ | 30138<br>(Note 3)  |
|    |                    | View                                    |                |                    |              |              |                    |
| 13 | 577                | Diagnostic Nadir<br>Profiler Earth View | -              | 289.3              |              | $\checkmark$ | 1354<br>(Note 3)   |
| 13 | 578                | Diagnostic Limb                         |                | 73503.1            |              | $\checkmark$ | 172000             |
|    |                    | Long-Exposure                           |                |                    |              |              | (Note 3)           |
| 13 | 579                | Diag Limb Profiler                      |                | 45994.1            |              | $\checkmark$ | 107628<br>(Note 2) |
| 13 | 580                | Diagnostic Madir                        |                | Varies             |              | $\checkmark$ | (NOLE 3)           |
| 15 | 500                | Total Column                            |                | Valles             |              |              | (Note 3)           |
|    |                    | Calibration                             | P              |                    |              |              | (11010-0)          |
| 13 | 581                | Diagnostic Nadir                        |                | Varies             |              | $\checkmark$ | Varies             |
|    |                    | Profiler Calibration                    |                |                    |              |              | (Note 3)           |
| 13 | 582                | Diagnostic Limb                         |                | Varies             |              | $\checkmark$ | Varies             |
|    |                    |                                         | mmand and Tala | <br>mota: Hondhook |              |              |                    |

Documented in the NPP Command and Telemetry Handbook

2. Packet sizes greater than the CCSDS maximum of 65542 are grouped packets. See the respective sections for detailed information.

The size of the calibration and diagnostic packets is configurable and not set at one value. The full available unbinned CCD requires multiple grouped packets to be sent. The maximum size of the packets including all primary and secondary headers in the multiple grouped packets is shown below.

- Nadir Total Column (APIDs 564, 576 and 580) = 1,142,606 octets. a.
- Nadir Profiler Calibration (APID 565) = 571,390 octets. b.
- Nadir Profiler Diagnostic (APIDs 577 and 581) = 1,142,606 octets. C.
- Limb Calibration (APIDs 566 and 582) = 1,142,592 octets. d.
- e. Diagnostic Limb Profiler (APIDs 578 and 579) = 1,142,584 octets.
- The size of the operational packets is also configurable. The table lists the baselined 4. sizes The maximum possible sizes are as follows: APID 560 -see footnote 3a, APID 561 see footnote 3b, APID 562 and 563 see footnote 3e.

## 4.3.6.1 Off Mode

In the instrument Off mode, the OMPS receives no external power. This includes primary and redundant survival heater power, and operational power. No mission data is output in Off Mode. There is no communication with the OMPS instrument in this

mode. In this mode, the only OMPS telemetry (TLM) that is available comes from passive temperature sensors that pass directly to the spacecraft. The instrument is in Off mode during launch and in the worst-case spacecraft power crisis situations once on orbit.

## 4.3.6.2 Survival Mode

In this mode the OMPS Primary and Redundant survival heaters are enabled. Enabling OMPS survival heaters is a spacecraft function and does not involve sending commands to the OMPS instrument. Thermostats control the turn-on and turn-off of survival power to the survival heaters. There is no communication with the OMPS instrument in this mode. In this mode, the only OMPS TLM that is available comes from passive temperature sensors that pass directly to the spacecraft. OMPS must be transitioned to this mode no later than 30 minutes after launch.

## 4.3.6.3 Boot Mode

In this mode the spacecraft supplies operational power to the OMPS instrument. Supplying operational power to the OMPS instrument is a spacecraft function and does not involve sending commands to the OMPS instrument. When OMPS operational power is initially supplied, bootstrap code executes and OMPS transitions itself to BOOT mode. Once in BOOT mode, OMPS FSW generates nominal Health and Status (HSD) telemetry and is ready to receive commands.

## 4.3.6.4 Safe-Hold Mode

SAFE-HOLD mode is the nominal protected, low-power mode for the OMPS instrument. This is the mode into which OMPS will autonomously transition itself in the event of a serious fault or limit violation – or from a spacecraft requested "safing" operation. OMPS FSW generates nominal Health and Status (HSD) telemetry in this mode, unless commanded to perform an Aliveness activity, during which Diagnostic packets are generated.

## 4.3.6.5 Decon Mode

DECON mode is a special mode designed primarily for early-orbit operations – and for routine orbit correction events. DECON mode – short for decontamination – is identical to OMPS OPERATE mode (see below), except that the Nadir and Limb diffuser wheel assemblies remain in their closed/home positions. The purpose of this mode is to configure the OMPS instrument in a safe, warm and operationally functional configuration during (1) the NPP observatory "outgassing" phase of early-orbit operations, and during (2) routine orbit correction events. In this mode OMPS is fully capable of generating internal calibration data. It is expected that OMPS will remain in this mode for approximately the first 30 days after launch. OMPS FSW generates nominal Health and Status (HSD) telemetry and Diagnostic science packets in this mode, unless commanded to perform the Functional and/or Darks activities, during which Calibration packets are generated.

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Figure 4.3-2 OMPS Modes and Mode Transitions

## 4.3.6.6 Operate Mode

OPERATE mode is the nominal configuration of the OMPS instrument during routine operations. In OPERATE mode, the Nadir and Limb sensors are powered on, the FPA window heaters are powered on, the FPA TECs are powered on and actively maintaining CCD temperatures at their nominal set points, and the Nadir and Limb diffuser wheel assemblies are in their open positions. In this mode OMPS is fully capable of generating science and calibration data.



Figure 4.3-3 OMPS Time Marker Description for a Descending Orbit

The OMPS has two possible states within Operational Mode: Earth Observation State and Calibration State.

In Earth observation operations, ozone data is reported in the Limb Profiler Long and Short Exposure packets, Nadir Total Column packet and the Nadir Profile packet. The Limb and Nadir sensors operate in an "ON" state during the approximately 50 minutes of each orbit when their fields of view are sunlit. Because the Limb Sensor views the antivelocity direction, its "ON" start time is delayed by approximately 8 minutes. Figure 4.3-3 shows the important times during an OMPS orbit (the Nadir Sensor is "ON" from t3 to t1; the Limb Sensor is on from t4 until t2). When a sensor is not "ON", it is in a "STANDBY" state (tpg program stopped, power on). During Earth observation, the OMPS processor in the MEB runs throughout the NPP orbit (100% duty cycle).

Calibration state is used to collect solar calibration data, dark signal data, and linearity correction data required on a weekly basis. It is defined as a separate state since the mechanisms and calibration lamps are configured differently than they are in OPERATIONAL mode.

The configuration of the instrument in the Calibration state is as follows:

- Nadir diffuser wheel is commanded to the appropriate positions (if NTC or NP solar calibration is being performed).
- Limb diffuser wheel is commanded to the appropriate positions (if LP solar calibration is being performed).
- Nadir Total Column calibration lamp is turned ON (if NTC linearity calibration is being performed).
- Nadir Profiler calibration lamp is turned ON (if NP linearity calibration is being performed).
- Limb Profiler calibration lamp is turned ON (if LP linearity calibration is being performed).

The calibrations of the limb and nadir sensors are nominally calibrated in subsequent orbits. CCD linearity and dark current measurements are nominally performed when the OMPS is in the shadow of the Earth with the aperture door closed during each calibration orbit.

### 4.3.7 Mission Data

The OMPS telemetry transferred via the MIL-STD-1553B bus consists of grouped packets that use the Consultative Committee for Space Data Systems (CCSDS) Path Protocol Data Unit format described in CCSDS 701.0-B-2. The first packet of a group has a primary header containing three 16-bit words (one 16-bit word = 2 octets) and a secondary header containing a four-word UTC time code, a one-word field denoting the number of packets in the group and a spare field. The OMPS formats the time of packet generation consistent with Table 4.1.3 in the secondary header. The time in the secondary header is not the time of observation for packets with CCD data; see the explanation below to derive the observation time from the secondary header. The middle and last packets of a group have only the three-word primary header. Because CCD images can be too large for a single group of 256 packets, the OMPS packets have an OMPS Header inside the User Data Zone of the first packet in each group to work around the CCSDS 8 bit sequence counter limitation. The OMPS Header contains the version number, the number of grouped packets remaining in the CCD image (Continuation Count), and a Continuation Flag set to 0 if the packet is the first of a group and set to 1 if the first packet is not the first of a multiple packet group. The largest OMPS images require five groups of packets. For these packets, the Continuation Count in first packet of the first group is set to 4 and the Flag is set to 0. The Continuation Count in the first packet of the second group is set to 3, but the flag is set to 1. The Continuation keeps decreasing to 0 by the fifth and final first packet and the Continuation Flag remains 0 in those packets. The CCSDS packet sequence counter increments continuously, so the first packet of the second group will have a CCSDS sequence count one greater than the last packet of the first group. Since the data in multiple grouped packets belong to a single CCD image, the secondary header timestamps are identical in all of the first packets in a multiple grouped packet. All fields in the OMPS data packets are big endian.

The OMPS Science, Calibration, and Diagnostic packet contain image data. The OMPS CCD image sensor is documented in more detail elsewhere but is summarized here for reference and to aid in understanding the generation and packaging of the OMPS X-band telemetry. The CCD has two mirror image halves that operate identically. Each half has a photo sensitive region extending 340 columns by 370 rows and a light shielded region 340 columns by 390 rows large. The extra 20 rows in the light shielded region are over-scanned rows containing only the smear signal and are used to subtract image transfer smear signal from the main image after the entire contents have been read out. To accommodate the on-chip charge-to-voltage conversion amplifiers, the serial CCD needs to be 12 pixels longer on each end than the CCD size. Therefore, the total length of a single line as read off from the imager will be 364 (i.e., 12 + 340 + 12) pixels. The extra 24 pixels (12 leading + 12 lagging) are used during calibration to determine the zero-input offset of the system. They are not currently included in the downlinked data during normal science operations.

Rows and columns are defined relative to the physical structure of the CCD and relate to the operation of the CCD. Since the OMPS CCD has two mirror image halves the output amplifiers are on opposite ends. The output amplifiers are connected by the readout CCD register. The rows and columns are defined relative to the output amplifiers and readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are parallel to the readout CCD register. The rows are transferred as a whole into the readout CCD register by a parallel transfer.

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are perpendicular to the readout CCD register. The columns are read out one at a time through serial transfers of the readout CCD register.

Every OMPS image comes from an image profile. The image profile number and any associated timing pattern, sample table, linearity correction table, and gain correction table are reported in OMPS image packets. The OMPS uses sample tables to bin CCD pixels into macro-pixels and to exclude bad pixels. If all the CCD pixels in a given macro-pixel go bad on orbit, the number of macro-pixels in the OMPS CCD data may be reduced, changing the size of the OMPS CCD data within any of the OMPS science, calibration, and diagnostic packets. It is also possible for the packets to contain all CCD pixels with no binning by a sample table. When a sample table is not used, the CCD data are framed in the packet by four-octet Hardware (HW) Start and End Tags, defined in Table 4.3.2. The CCD images described below are those baselined by OMPS at the time of delivery for NPP integration. The size of the packets can be expected to change on-orbit due to changes in the sample table. Since calibration and diagnostic packets contain multiple types of images, each with a different size, a generic description is given for them and the size is left indefinite.

| Image Type                | APIDs              | Start Tag  | End Tag    |
|---------------------------|--------------------|------------|------------|
| Nadir Total Column (TC)   | 560, 564, 576, 580 | 0x81000000 | 0xC1000000 |
| Nadir Profiler (NP)       | 561, 565, 577, 581 | 0x82000000 | 0xC2000000 |
| Limb Profiler Short (LPS) | 563, 566, 579, 582 | 0x91000000 | 0xD1000000 |
| Limb Profiler Long (LPL)  | 562, 578           | 0x92000000 | 0xD2000000 |
|                           |                    |            |            |

| Table 4.3.2 | OMPS | Hardware | Tags |
|-------------|------|----------|------|
|-------------|------|----------|------|

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| 560         NTC EV         0         80           561         NP EV         0         80                   | 8727.6           |
|------------------------------------------------------------------------------------------------------------|------------------|
| 561 NP EV 0 80                                                                                             | 0121.0           |
|                                                                                                            | 20/27 7          |
|                                                                                                            | 10050 7          |
|                                                                                                            | 19909.7          |
| 503 LPS EV U 80                                                                                            | 18330.7          |
| 564     10 Solar     21, 22, 23, 24, 25, 87       26, 27                                                   | 6047.9           |
| 564 TC Lamp FF 16 85                                                                                       | Note 1           |
| 564 TC Lamp ST 18 86                                                                                       | Note 1           |
| 564 TC Dark 1 FF 2 82                                                                                      | Note 1           |
| 564 TC Dark Coadd FF 11 84                                                                                 | Note 1           |
| 565 NP Solar 20 92                                                                                         | 5779.3           |
| 565 NP Lamp FF 15 90                                                                                       | Note 1           |
| 565 NP Lamp ST 17 91 🔨 🕅                                                                                   | Note 1           |
| 565 NP Dark 1 FF 1 81                                                                                      | Note 1           |
| 565 NP Dark Coadd FF 10 89                                                                                 | Note 1           |
| 566 LP Solar 20.21.22 125                                                                                  | 8381.7           |
| 566 LP Lamp FF 15 123                                                                                      | Note 1           |
| 566 LP Lamp ST 16 124                                                                                      | Note 1           |
| 566 LPL Dark 1 FF 1 121                                                                                    | Note 1           |
| 566 LPS Dark 1 FF 1 121                                                                                    | Note 1           |
| 566 LPL Dark COADD 10 122                                                                                  | Note 1           |
| FF IIII                                                                                                    |                  |
| 566 LPS Dark COADD 10 122<br>FF 122                                                                        | Note 1           |
| 576 NTC EV Diag 5 80                                                                                       | Note 1           |
| 577 NP EV Dlag 5 80                                                                                        | Note 1           |
| 578 LPL EV Diag 5 80                                                                                       | Note 1           |
| 579 LPS EV Diag 5 80                                                                                       | Note 1           |
| 580 NTC Cal Diag 8 83                                                                                      | Note 1           |
| 580 Diag NTC FF 7 82                                                                                       | Note 1           |
| 580 Diag NTC Dark Cal 31 84                                                                                | Note 1           |
| 580 Diag NTC LED Cal 36 85                                                                                 | Note 1           |
| FE                                                                                                         |                  |
| 580 Diag NTC LED Cal 38 86<br>ST 86                                                                        | Note 1           |
| 580 Diag NTC Solar Cal 41, 42, 43, 44, 45, 87<br>46, 47                                                    | Note 1           |
| 581 NP Cal Diag 8 83                                                                                       | Note 1           |
| 581 Diag NP FF 6 81                                                                                        | Note 1           |
| 581 Diag NP Dark Cal 30 89                                                                                 | Note 1           |
| 581 Diag NP LED FF 35 90                                                                                   | Note 1           |
| 581 Diag NP LED ST 37 91                                                                                   | Note 1           |
| 581 Diag NP Solar Cal 40 92                                                                                | Note 1           |
|                                                                                                            |                  |
| 582 Diag LP FF 6 121                                                                                       | Note 1           |
| 582         Diag LP FF         6         121           582         Diag LP Dark Cal         30         122 | Note 1<br>Note 1 |

## Table 4.3.3 OMPS Timestamp Offset

|     | FF                    |            |     |        |
|-----|-----------------------|------------|-----|--------|
| 582 | Diag LP LED Cal<br>ST | 36         | 124 | Note 1 |
| 582 | Diag LP Solar Cal     | 40, 41, 42 | 125 | Note 1 |

Note 1: OMPS On-Orbit Operator's Manual contains further timing details for the values above, but does not contain timing information on the Lamp and Dark images.

A timestamp for each image is present in two separate fields in each OMPS image packet: The Start of Scan field of the packet secondary header and the Last\_IMG TLM set in the first packet before the CCD data. This timestamp does not correspond to the start of observation for the image, but instead corresponds to a time after all image data has been observed and transferred into the processor. In order to correctly geolocate and use the image data in ground processing, the start of image time must be used. Table 4.3.3 below provides the offset in ms from the timestamps in the AP to the start of observation for the image. The data is organized by APID and Profile ID.

## 4.3.7.1 Science Data

The OMPS produces four science data packets described below: Nadir Total Column Earth View, Nadir Profile Earth View, Limb Profile Exposure #1 (aka L1, Long Exposure) and Limb Profile Exposure #2 (aka L2, Short Exposure). Each packet contains the health and status telemetry that is required to process the CCD data followed by CCD data.

## 21.3.7.1.1 Nadir Total Column

The Nadir TC uses both halves of the CCD. The TC image is aligned with the spectral dimension in columns (each column corresponds to a different spectral wavelength) and the spatial dimension in rows (each row corresponds to a different cross-track spatial location). The TC produces useful data from almost all of the CCD rows, but uses only about two thirds of the columns. The data is temporally co-added and binned in the spatial dimension. The number of pixels required in the spatial dimension is derived from the minimum horizontal cross-track FOV of 110 degrees. The number of pixels in the spectral dimension is based on the required spectral range, the spectral scale of the instrument, the uncertainty in the spectral scale, and the alignment of the focal plane to the spectral range. See "OMPS CCD Reference Figures" for explanation of the pixel binning and alignment.

RATION

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.


# Figure 4.3-5 OMPS Total Column On-Orbit Windowing and Spatial Binning

The TC image is taken from a 198 x 740 pixel area of the CCD image: 198 pixels in the spectral column and 700 pixels in the spatial row. There are 2 sets of 20 over-clocked rows of which the center 16 are used. Binning is performed in the spatial dimension centered about the nadir pixel column. The nadir row is determined based on instrument to spacecraft mounting alignment. Binning in the spatial dimension is 20:1 with 17.5 bins on each side of the nadir bin. There is one over-clocked bin generated for each half of the CCD. See Figure 4.3-5.

The OMPS outputs the Nadir Total Column packet (APID 560) in one grouped packet containing 30 CCSDS packets. The first and middle CCSDS packets are 1024 octets; the final packet is 444 octets for a total of 30140 octets. The first packet contains the 10 octet secondary header (time code, number of packets, and spare), the OMPS header (RDR version, number of grouped packets [Cont Count], and a flag indicating multiple grouped packets [Cont Flag]), 153 octets of engineering data, and the beginning of the CCD data. The CCD data in the user data fields totals 196x38 binned 32-bit pixels or 29792 octets.

- 180 (30 x 6 octets primary header)
- + 10 (octets secondary header)
- + 4 (octets OMPS Header)
- + 151 (octets engineering data)
- + 29793 (octets science data plus pad byte)
- = 30138 total octets.

The packet is generated approximately every 7.488 seconds. The structure of APID 560 is illustrated in Figure 4.3-6, Figure 4.3-7 and Figure 4.3-8 and the user data fields are listed in Table 4.3.4.



MIDDLE PACKET Qty. 28



# Figure 4.3-7 OMPS Nadir Total Column Middle Packet Format



| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A                                                                                                                    | U         |
| 24        | 8           | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR                                      | N/A                        | N/A                                                                                                                    | U         |
| 32        | 8           | SENSOR_ID        | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A                                                                                                                    | U         |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | U         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB SBC ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0<br>-1                    | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0                          | Boot Side 1<br>Boot Side 2                                                                                             | U         |
| 96        | 7           | M_MCR_SPARE6     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0                          | OFF<br>ON                                                                                                              | U         |
| 104       | 3           | M MCR SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0                          | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M MCR SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M MCR SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 0                          | NOT_BUSY<br>BUSY                                                                                                       | U         |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                               | 0                          | OFF                                                                        | U         |
| 140       | 3           | M_THCR_SPARE5    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 143       | 1           | M_NP_TEC_STATE   | State of the NP TEC Control                               | 0                          | OFF                                                                        | U         |
| 144       | 3           | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                               | 0                          | OFF                                                                        | U         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          |                                                                            | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED                                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_DISABLED<br>PWR_ENABLED                                                | U         |
| 164       | 1           |                  | ND TEC Dawar State                                        | 0                          | PWR_DISABLED<br>PWR_ENABLED                                                |           |
| 104       |             | MEB_NF_TEC_FWR   | NF TEC Power State                                        | 1                          | PWR_DISABLED                                                               |           |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_DISABLED                                                               | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0<br>1                     | OPEN                                                                       | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED                                                                     | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0                          |                                                                            | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0                          |                                                                            | U         |
| 174       | 1           | MEB N CLKDRV RED | Nadir Clock Drive Relay Redundant Position                | 0                          |                                                                            | U         |
| 175       | 1           |                  | Nadir Clock Drive Relay Primary Position                  | 0                          | ALL_PRIMARY                                                                |           |
| 175       | 1           | MEB_N_CLKDKV_PRI | Nadir Clock Drive Relay Primary Position                  | 1                          | NOT_PRIMARY                                                                | U         |
|           |             | pBA              |                                                           |                            |                                                                            |           |

# Table 4.3.4 OMPS Nadir Total Column Packet User Data Fields (cont)

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name       | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------|-----------|
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                           | 0<br>1                     | OPEN<br>CLOSED                                                                   | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay                 | 0<br>1                     | CLOSED<br>OPEN                                                                   | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay                | 0                          | CLOSED                                                                           | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                                   | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                                 | 0                          |                                                                                  | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                                   | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                                 | 0                          | OPEN<br>CLOSED                                                                   | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                                   | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                                   | 0                          | NADIR<br>LIMB                                                                    | U         |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0<br>1                     | OPEN<br>CLOSED                                                                   | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                              | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                                   | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0<br>1                     | OFF<br>ON                                                                        | U         |
| 208       | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                                 | U         |
| 209       | 15          | M_N_RESOLV_SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                              | U         |
| 224       | 16          | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                              | U         |
| 240       | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                        | U         |
| 247       | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CW<br>CCW                                                                        | U         |
| 248       | 2           | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                        | U         |
| 250       | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10                  | U         |
| 252       | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW                                                                               | U         |
| 254       | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | IVVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS<br>A_PLUS_B_MINUS | U         |
| 256       | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                        | U         |
| 260       | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                              | U         |
| 272       | 8           | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                              | U         |
| 280       | 16          | M_N_DESTINATION  | Nadir Diffuser Move Destination                                | N/A                        | N/A                                                                              | U         |
| 296       | 16          | M_TC_TEC_SETPT   | Commanded TC TEC Setpoint                                      | N/A                        | N/A                                                                              | U         |
| 312       | 16          | M_IC_HIR_SEIPI   | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                              | U U       |
| 328       | 16          | M ND HTD SETDT   | Commanded NP TEC Setpoint                                      | N/A                        | N/A<br>N/A                                                                       |           |
| 360       | 10          |                  | Nadir Diffusor Meter Desition                                  | IN/A                       | N/A                                                                              | U         |
| 300       | 10          |                  | Nadir Diffusor Position ID                                     | N/A<br>N/A                 | N/A                                                                              |           |
| 384       | 8           |                  | Nadir Active Timing Pattern Table Version Number major version | N/A                        | Ν/Δ<br>Ν/Δ                                                                       |           |
| 392       | 8           |                  | Nadir Active Timing Pattern Table Version Number major Version | N/A                        | Ν/Δ                                                                              | 1 ii      |
| 400       | 16          | N IMG STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                              | 1 ŭ       |
| 416       | 32          | N INT HOLD TIME  | Nadir TPG Integration Hold Time                                | milliseconds               | 0.1.0                                                                            | 1 Ŭ       |
| , ,       |             |                  | · · · · · · · · · · · · · · · · · · ·                          |                            | · · · · ·                                                                        |           |

| Table 4.3.4 O | MPS Nadir Total | <b>Column Packet User</b> | Data Fields | (cont) |
|---------------|-----------------|---------------------------|-------------|--------|
|---------------|-----------------|---------------------------|-------------|--------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | N_PROFILE_ID     | Active Nadir Profile ID                                  | N/A                        | N/A                                                                        | U         |
| 456       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 464       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 472       | 16          | N_TIM_PAT_TBL    | Nadir Timing Pattern Table ID                            | N/A                        | N/A                                                                        | U         |
| 488       | 16          | TC_APID          | Nadir Total Column Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | NP_APID          | Nadir Profiler Application ID                            | N/A                        | N/A                                                                        | U         |
| 520       | 8           | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | TC LIN CORR TBL  | Nadir Total Column Linearity Correction Table ID         | N/A                        | N/A                                                                        | U         |
| 544       | 16          | TC FIXED COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A                        | N/A                                                                        | U         |
| 560       | 8           | TC REORDER IMG   | Nadir Total Column Reorder Image Flag                    | 0                          | DISABLED                                                                   | U         |
|           |             |                  |                                                          | 1                          | ENABLED                                                                    |           |
| 568       | 8           | TC_GAIN_CORR     | Nadir Total Column Gain Correction Flag                  | 1                          | ENABLED                                                                    | U         |
| 576       | 16          | TC GAIN CORR TBL | Nadir Total Column Gain Correction Table ID              | N/A                        | N/A                                                                        | U         |
| 592       | 8           | TC_BIN_IMG       | Nadir Total Column Bin Image Flag                        | 0                          | DISABLED                                                                   | U         |
| 600       | 10          |                  | Nadir Tatal Calumn Cample Table ID                       | NIA                        | ENABLED                                                                    |           |
| 600       | 10          | TC_SAWP_TBL      |                                                          | N/A                        |                                                                            | 0         |
| 616       | 8           | NP_LIN_CORR      | Nadir Profiler Linearity Correction Flag                 | 1                          | ENABLED                                                                    | U         |
| 624       | 16          | NP_LIN_CORR_TBL  | Nadir Profiler Linearity Correction Table ID             | N/A                        | N/A                                                                        | U         |
| 640       | 16          | NP_FIXED_COADDS  | Nadir Profiler Fixed Coadd Count                         | N/A                        | N/A                                                                        | U         |
| 656       | 8           | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 664       | 8           | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 672       | 16          | NP GAIN CORR TBL | Nadir Profilier Gain Correction Table ID                 | N/A                        | N/A                                                                        | U         |
|           |             |                  |                                                          | 0                          | DISABLED                                                                   |           |
| 688       | 8           | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 1                          | ENABLED                                                                    | U         |
| 696       | 16          | NP SAMP TBL      | Nadir Profilier Sample Table ID                          | N/A                        | N/A                                                                        | U         |
| 712       | 8           | TC GAIN TBL VER  | Nadir Total Column Gain Table Version major version      | N/A                        | N/A                                                                        | U         |
| 720       | 8           | TC GAIN TBL VER  | Nadir Total Column Gain Table Version minor version      | N/A                        | N/A                                                                        | U         |
| 728       | 8           | NP GAIN TBL VER  | Nadir Profiler Gain Table Version major version          | N/A                        | N/A                                                                        | U         |
| 736       | 8           | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version minor version          | N/A                        | N/A                                                                        | U         |
| 744       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A                        | N/A                                                                        | U         |
| 752       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version minor version | N/A                        | N/A                                                                        | U         |
| 760       | 8           | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A                        | N/A                                                                        | U         |
| 768       | 8           | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version minor version     | N/A                        | N/A                                                                        | U         |
| 776       | 8           | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A                        | N/A                                                                        | U         |
| 784       | 8           | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version minor version    | N/A                        | N/A                                                                        | U         |
| 792       | 8           | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A                        | N/A                                                                        | U         |
| 800       | 8           | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version minor version        | N/A                        | N/A                                                                        | U         |

Nadir Total Column Sa. Nadir Total Column Sa. Nadir Total Column Sa. Nadir Profiler Sample Nadir Profiler Sample i

| Table 4.3.4 | <b>OMPS</b> Nadir | Total C | olumn | Packet L | Jser [ | Data I | Fields ( | (cont) |
|-------------|-------------------|---------|-------|----------|--------|--------|----------|--------|
|-------------|-------------------|---------|-------|----------|--------|--------|----------|--------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                          | Data Type |
|-----------|-------------|------------------|------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 808       | 16          | TC_ROWS          | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                 | U         |
| 824       | 16          | TC_COLS          | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                 | U         |
| 840       | 16          | TC_LAST_IMG_DOY  | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                 | U         |
| 856       | 32          | TC_LAST_IMG_MSEC | Time stamp of last good TC image               | milliseconds               | N/A                                                                                                                                                                                                                                 | U         |
| 888       | 16          | TC_LAST_IMG_USEC | Time stamp of last good TC image               | microseconds               | N/A                                                                                                                                                                                                                                 | U         |
| 904       | 16          | M_I_CAL_LED      | Current in the active Calibration LED          | milliamps                  | -, -, -, 0.005086,0                                                                                                                                                                                                                 | S         |
| 920       | 16          | M_T_MTR_DRV_BD   | Temperature - Motor Driver Board               | Celsius                    | -, -, -, 0.0484, -273.15                                                                                                                                                                                                            | S         |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7, 7 | s         |
| 952       | 16          | TC T CCD         | Temperature - Nadir Total Column CCD           | Celsius 🔺                  | 0.00737, 3.76                                                                                                                                                                                                                       | S         |
| 968       | 16          | NP T CCD         | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                          | S         |
| 984       | 16          | M V MTR RES 5V   | Voltage - Motor/Resolver Electronics +5V       | Volts                      | -, -, -, 0.00311, 0                                                                                                                                                                                                                 | S         |
| 1000      | 16          | M V RES 12V      | Voltage - Resolver Electronics +12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                           | S         |
| 1016      | 16          | M V RES M12V     | Voltage - Resolver Electronics -12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                           | S         |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -199, 128.8<br>84 to 343: -, -, -1.465E-6, 0.01323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7    | S         |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.2023, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7   | s         |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1128      | 16          | TC_P_HTR_SET     | Power Setpoint - TC Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                              | S         |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                 | S         |
| 1160      | 16          | N_T_SIG_BD       | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                            | S         |
| 1176      | 16          | N_T_TIM_BD       | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1208      | 16          | NP_T_WINDOW      | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1224      | 16          | TC_T_WINDOW      | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1240      | 238336      | N/A              | CCD Data (196 x 38 pixels x 32 bits/pixel)     | N/A                        | N/A                                                                                                                                                                                                                                 | U         |
| 239576    | 8           | N/A              | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                 | U         |
|           |             | <b>BBAT</b>      |                                                |                            |                                                                                                                                                                                                                                     |           |

# 21.3.7.1.2 Nadir Profiler

The Nadir Profiler (NP) only uses one half (the A/C half) of the CCD and is aligned the same way as the TC with the spectral dimension in columns and spatial dimension in rows. Each column corresponds to a different spectral wavelength and each row a different spatial location. The number of pixels that are required in the spatial dimension is derived from the 250 km swath width requirement. The number of pixels in the spectral dimension is based on the required spectral range, the spectral scale of the instrument, the uncertainty in the spectral scale, and the alignment of the focal plane to the spectral range. See "OMPS CCD Reference Figures" for explanation of the pixel binning and alignment.



Figure 4.3-9 OMPS Nadir Profile On-orbit Windowing and Spatial Binning

The NP image data is taken from a 154 row x 96 column pixel area of the light sensitive portion of the CCD. Binning is performed in the spatial dimension centered about the nadir pixel row. Again, the nadir row is determined based on instrument to spacecraft mounting alignment. There is no binning in the spectral dimension. There is one overclocked bin generated for the half of the CCD in use. The center 16 (of 20) rows are binned spatially with no binning of spectral over-clocked rows. See Figure 4.3-9.

The OMPS outputs the Nadir Profiler data (APID 561) in one grouped packet containing 2 CCSDS packets. The first packet is 1024 octets; the second and final packet is 332 octets for a total of 1356 octets. The first packet contains the 10 octet secondary header (time code, number of packets, and packet version), the OMPS header (RDR version, number of grouped packets [Cont Count], and a flag indicating multiple grouped packets [Cont Flag]), 153 octets of engineering data, and the beginning of the CCD data. The CCD data in the user data field consist of 147 x 2 binned pixels, totaling to 1356 octets.

- 12 (2 x 6 octets primary header)
- + 10 (octets secondary header)
- + 4 (octets OMPS header)
- + 151 (octets engineering data)
- + 1177 (octets science data plus pad byte)
- = 1354 total octets.

The packet is generated approximately every 37.44 seconds. The structure of APID 561 is illustrated in Figure 4.3-10 and Figure 4.3-11. The user data fields are listed in Table 4.3.5.

FIRST PACKET



Figure 4.3-10 OMPS Nadir Profiler First Packet Format



r Profile L.

| Table 4.3.5 | <b>OMPS</b> Nadir | <b>Profiler Packet</b> | <b>User Data Fields</b> |
|-------------|-------------------|------------------------|-------------------------|
|-------------|-------------------|------------------------|-------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A                                                                                                                    | U         |
| 24        | 8           | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR                                      | N/A                        | N/A                                                                                                                    | U         |
| 32        | 8           | SENSOR_ID        | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A                                                                                                                    | U         |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | U         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0                          | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0                          | Boot Side 1<br>Boot Side 2                                                                                             | U         |
| 96        | 7           | M_MCR_SPARE6     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 104       | 3           | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M MCR SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 0                          | NOT_BUSY<br>BUSY                                                                                                       | U         |

| Table 4.3.5 | <b>OMPS Nadir Profiler</b> | Packet User Data Fields (cont) |
|-------------|----------------------------|--------------------------------|
|-------------|----------------------------|--------------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                               | 0                          | OFF                                                                        | U         |
| 140       | 3           | M_THCR_SPARE5    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 143       | 1           | M_NP_TEC_STATE   | State of the NP TEC Control                               | 0                          | OFF                                                                        | U         |
| 144       | 3           | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                               | 0                          | OFF                                                                        | U         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M NP HTR STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M THCR SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | ON<br>N/A                                                                  | U         |
| 159       | 1           | M LP HTR STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 100       |             |                  |                                                           | 1                          | ON<br>PWR ENABLED                                                          |           |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 1                          | PWR_DISABLED                                                               | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB TC HTR PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED                                                                | U         |
|           |             |                  |                                                           | 1                          | PWR_DISABLED PWR_ENABLED                                                   |           |
| 163       | 1           | MEB_LP_TEC_PWR   | LP IEC Power State                                        | 1                          | PWR_DISABLED                                                               | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED                                                                     | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED                                                                     | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED                                                                | U         |
| 160       | 1           | MER N BWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED                                                                |           |
| 103       |             |                  | Naun Power Supply State                                   | 1                          | PWR_DISABLED                                                               |           |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 1                          | OPEN                                                                       | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0                          | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0                          | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0                          | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0                          | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M MCSR SPARE5    | Unused register bits                                      | 0                          | OPEN                                                                       | U         |
|           | -           |                  |                                                           | 1                          | CLOSED                                                                     | -         |

|           |             |                  |                                                                |                            | A                                                                          |           |
|-----------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                                 | 0                          |                                                                            | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                                 | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                                   | 0                          | NADIR<br>LIMB                                                              | U         |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0                          | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M N RESOLV SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |
| 240       | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_N_DESTINATION  | Nadir Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_TC_TEC_SETPT   | Commanded TC TEC Setpoint                                      | N/A                        | N/A                                                                        | U         |
| 312       | 16          | M_TC_HTR_SETPT   | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_NP_TEC_SETPT   | Commanded NP TEC Setpoint                                      | N/A                        | N/A                                                                        | U         |
| 344       | 16          | M_NP_HTR_SETPT   | Commanded NP CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | U         |
| 360       | 16          | M_N_POSITION     | Nadir Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 376       | 8           | M_N_POS_ID       | Nadir Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 384       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        |           |
| 392       | 8           | N_HM_PAT_VER     | Nadir Active Liming Pattern Lable Version Number minor version | N/A                        | N/A                                                                        |           |
| 400       | 16          |                  | Nadir Image Processing Status                                  | N/A                        | N/A                                                                        |           |
| 416       | 32          |                  | Nadir TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             | DBA              |                                                                |                            |                                                                            |           |

| Table 4.3.5 | <b>OMPS Nadir Prof</b> | iler Packet User | · Data Fields (cont) |
|-------------|------------------------|------------------|----------------------|
| 10010 4.0.0 |                        |                  | Butu i loido (oont)  |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | N_PROFILE_ID     | Active Nadir Profile ID                                  | N/A                        | N/A                                                                        | U         |
| 456       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 464       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 472       | 16          | N_TIM_PAT_TBL    | Nadir Timing Pattern Table ID                            | N/A                        | N/A                                                                        | U         |
| 488       | 16          | TC_APID          | Nadir Total Column Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | NP_APID          | Nadir Profiler Application ID                            | N/A                        | N/A                                                                        | U         |
| 520       | 8           | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | TC_LIN_CORR_TBL  | Nadir Total Column Linearity Correction Table ID         | N/A                        | N/A                                                                        | U         |
| 544       | 16          | TC_FIXED_COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A                        | N/A                                                                        | U         |
| 560       | 8           | TC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | TC_GAIN_CORR     | Nadir Total Column Gain Correction Flag                  | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | TC_GAIN_CORR_TBL | Nadir Total Column Gain Correction Table ID              | N/A                        | N/A                                                                        | U         |
| 592       | 8           | TC_BIN_IMG       | Nadir Total Column Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | TC_SAMP_TBL      | Nadir Total Column Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 8           | NP_LIN_CORR      | Nadir Profiler Linearity Correction Flag                 | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 624       | 16          | NP LIN CORR TBL  | Nadir Profiler Linearity Correction Table ID             | N/A                        | N/A                                                                        | U         |
| 640       | 16          | NP_FIXED_COADDS  | Nadir Profiler Fixed Coadd Count                         | N/A                        | N/A                                                                        | U         |
| 656       | 8           | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 664       | 8           | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 672       | 16          | NP_GAIN_CORR_TBL | Nadir Profilier Gain Correction Table ID                 | N/A                        | N/A                                                                        | U         |
| 688       | 8           | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 696       | 16          | NP_SAMP_TBL      | Nadir Profilier Sample Table ID                          | N/A                        | N/A                                                                        | U         |
| 712       | 8           | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version major version      | N/A                        | N/A                                                                        | U         |
| 720       | 8           | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version minor version      | N/A                        | N/A                                                                        | U         |
| 728       | 8           | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A                        | N/A                                                                        | U         |
| 736       | 8           | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version minor version          | N/A                        | N/A                                                                        | U         |
| 744       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A                        | N/A                                                                        | U         |
| 752       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version minor version | N/A                        | N/A                                                                        | U         |
| 760       | 8           | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A                        | N/A                                                                        | U         |
| 768       | 8           | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version minor version     | N/A                        | N/A                                                                        | U         |
| 776       | 8           | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A                        | N/A                                                                        | U         |
| 784       | 8           | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version minor version    | N/A                        | N/A                                                                        | U         |
| 792       | 8           | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A                        | N/A                                                                        | U         |
|           |             | JR.              |                                                          |                            |                                                                            |           |

| Table 4.3.5 | OMPS Nadir Profiler Packet User Data Fields (co | nt)  |
|-------------|-------------------------------------------------|------|
|             |                                                 | •••• |

|           |                               |                    |                                                |                            | A.                                                                                                                                                                                                                                  |           |
|-----------|-------------------------------|--------------------|------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Bit Mnemonic Name Description |                    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                          | Data Type |
| 808       | 16                            | NP ROWS            | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                 | 1 U       |
| 824       | 16                            | NP COLS            | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                 | - ŭ       |
| 840       | 16                            | NP LAST ING DOX    | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                 |           |
| 956       | 22                            |                    | Time stamp of last good TC image (uay of year) | millicocondo               | N/A                                                                                                                                                                                                                                 |           |
| 000       | 16                            |                    |                                                | miaraaaaanda               | N/A                                                                                                                                                                                                                                 |           |
| 000       | 10                            | INP_LAST_IMIG_USEC | Time stamp of last good TC image               | microseconds               | N/A                                                                                                                                                                                                                                 | 0         |
| 904       | 16                            | M_I_CAL_LED        | Current in the active Calibration LED          | miniamps                   | -, -, -, -, 0.005066,0                                                                                                                                                                                                              | 5         |
| 920       | 16                            | M_I_MIR_DRV_BD     | l'emperature - Motor Driver Board              | Ceisius                    | -, -, -, -, 0.0484, -273.15                                                                                                                                                                                                         | 5         |
| 936       | 16                            | N_T_TELESCOPE      | Temperature - Nadir Telescope                  | Celsius                    | -32768 to 38: -, -, -8.459E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 952       | 16                            | TC_T_CCD           | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                          | S         |
| 968       | 16                            | NP_T_CCD           | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -0.00737, 3.76                                                                                                                                                                                                             | S         |
| 984       | 16                            | M V MTR RES 5V     | Voltage - Motor/Resolver Electronics +5V       | Volts                      | 0.00311.0                                                                                                                                                                                                                           | S         |
| 1000      | 16                            | M V RES 12V        | Voltage - Resolver Electronics +12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                           | S         |
| 1016      | 16                            | M V RES M12V       | Voltage - Resolver Electronics -12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                           | S         |
| 1010      | 10                            | M_1_1(E0_111E1     |                                                | Volto                      | -32768 to 83'                                                                                                                                                                                                                       |           |
| 1032      | 16                            | N_T_MOTOR          | Temperature - Nadir Diffuser Motor             | Celsius                    | - 52769 10 53: -, -, -1.465E-5, 0.02233, -1.99, 128,6<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1048      | 16                            | N_T_HOUSING        | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767; -, -, -9.53E-11, 1.817E-6, -0.01566, 7    | s         |
| 1064      | 16                            | N_T_SUN_SIDE       | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.0156.6, 77  | S         |
| 1080      | 16                            | N_T_DARK_SIDE      | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.0166, 77    | S         |
| 1096      | 16                            | TC_T_COND_BAR      | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1112      | 16                            | NP_T_COND_BAR      | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1128      | 16                            | TC_P_HTR_SET       | Power Setpoint - TC Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                              | S         |
| 1144      | 16                            | NP_P_HTR_SET       | Power Setpoint - NP Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                 | S         |
| 1160      | 16                            | N_T_SIG_BD         | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                            | S         |
| 1176      | 16                            | N T TIM BD         | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486,-273.15                                                                                                                                                                                                             | S         |
| 1192      | 16                            | TC_T_HOUSING       | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1208      | 16                            | NP_T_WINDOW        | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1224      | 16                            | TC T WINDOW        | Temperature - TC Window                        | Celsius                    | 0.0486273.15                                                                                                                                                                                                                        | S         |
| 1240      | 9408                          | N/A                | CCD Data (147 x 2 nixels x 32 hits/nixel)      | N/A                        | N/A                                                                                                                                                                                                                                 | ū         |
| 10648     | 8                             | N/A                | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                 | ŭ         |
|           |                               | - IR               |                                                |                            |                                                                                                                                                                                                                                     |           |

#### 4.3.7.1.3 Limb Profiler Long Exposure

The Limb Profiler uses both halves of the CCD. The Limb alignment is the opposite of the Nadir instrument with the spectral dimension in rows and the spatial dimension in columns. Each row corresponds roughly to a different spectral wavelength and each column to a different spatial location. The Limb uses virtually the entire focal plane to produce science data. The Limb instrument produces two images from the same focal plane, a long integration image and a short integration image.

The OMPS outputs the Limb Profiler Long (L1) Exposure data (APID 562) in one grouped packet containing 168 CCSDS packets. The first and middle packets are 1024 octets; the final packet is 994 octets. The packet is generated every 18.72 seconds. The structure of APID 562 is illustrated in Figure 4.3-12, Figure 4.3-13 and Figure 4.3-14. The user data fields are listed in Table 4.3.6.



Figure 4.3-12 OMPS Limb Profiler Long Exposure First Packet Format

#### GSFC 429-05-02-42

#### NPP MDFCB

MIDDLE PACKET Qty. 166

|        |              |                   | PACKE           | T PRIMARY | HEADER            |                   |            | User Data Field      |       |
|--------|--------------|-------------------|-----------------|-----------|-------------------|-------------------|------------|----------------------|-------|
|        | Verson       | Packe             | t Identifi      | cation    | Packet S          | Sequence          | Packet     | Science              |       |
|        | No.          | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length     | CCD data<br>(middle) | TOTAL |
| Bits   | 3            | 1                 | 1               | 11        | 2                 | 14                | 16         | 8144                 | 8192  |
| Octets |              |                   | 2               |           | 2                 |                   | 2          | 1018                 | 1024  |
| Value  | 000          | 0 /               | 0               | 0x232     | 00                | varies            | 0x03F9     | varies               |       |
| Те     | lemetry Pack | et                |                 |           |                   | Midd              | lle Packet | The second           | -     |

TOTAL Middle Packets 1359872 169984

# Figure 4.3-13 OMPS Limb Profiler Long Exposure Middle Packet Format

LAST PACKET

| _      |             |                   |                 |           |                   |                   |        |                   |          |       |           |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------|----------|-------|-----------|
|        |             |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field   |          |       |           |
|        | Verson      | Packe             | t Identifio     | cation    | Packet            | Sequence          | Packet | Science           |          |       |           |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | Pad Byte | TOTAL | RDR TOTAL |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16     | 7656              | 8        | 7712  | 1375776   |
| Octets |             |                   | 2               |           |                   | 2                 | 2      | 985               | 1        | 992   | 172000    |
| Value  | 000         | 0 /               | 0               | 0x232     | 10                | varies            | 0x03D9 | varies            | fixed    |       |           |
| Tel    | emetry Pack | et                |                 |           |                   | Last              | Packet |                   |          | _     |           |

Figure 4.3-14 OMPS Limb Profiler Long Exposure Last Packet Format

| Table 4.3.6 OMPS Limb Profiler Lor | ng Exposure Packet User Data Fields |
|------------------------------------|-------------------------------------|
|------------------------------------|-------------------------------------|

| Start Bit | itart Bit Mnemonic Name |                  | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                              | Data Type |
|-----------|-------------------------|------------------|-----------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16                      | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                     | U         |
| 16        | 8                       | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A                                                                                                                     | U         |
| 24        | 8                       | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR                                      | N/A                        | N/A<br>N/A                                                                                                              |           |
| 32        | 8                       | SENSOR_ID        | CMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A<br>N/A                                                                                                              |           |
| 40        | 8                       | ESW VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A<br>N/A                 | N/A N/A                                                                                                                 |           |
| 56        | 2                       | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDM–which we should never boot from) | U         |
| 58        | 5                       | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                     | U         |
| 63        | 1                       | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                            | U         |
| 64        | 8                       | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0<br>-1                    | OK<br>ERROR                                                                                                             | U         |
| 72        | 8                       | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                     | U         |
| 80        | 8                       | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1                          | PROTECTED<br>UNPROTECTED                                                                                                | U         |
| 88        | 4                       | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                               | U         |
| 92        | 4                       | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0<br>1                     | Boot Side 1<br>Boot Side 2                                                                                              | U         |
| 96        | 7                       | M_MCR_SPARE6     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 103       | 1                       | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 104       | 3                       | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 107       | 1                       | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 108       | 3                       | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 111       | 1                       | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 112       | 7                       | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 119       | 9                       | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 128       | 7                       | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 135       | 1                       | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 0<br>1                     | NOT_BUSY<br>BUSY                                                                                                        | U         |
| 136       | 3                       | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 139       | 1                       | M_TC_TEC_STATE   | State of the TC TEC Control                                                       | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 140       | 3                       | M_THCR_SPARE5    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 143       | 1                       | M_NP_TEC_STATE   | State of the NP TEC Control                                                       | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 144       | 3                       | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 147       | 1                       | M_LP_TEC_STATE   | State of the LP TEC Control                                                       | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 148       | 3                       | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 151       | 1                       | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                         | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 152       | 3                       | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 152       | 3                       | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register                         | <u>N/A</u>                 | N/A                                                                                                                     |           |

| Table 4.3.6 OMPS Limb Profiler Long Exposure Packet User Data Fields ( | cont) |
|------------------------------------------------------------------------|-------|
|                                                                        |       |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M THCR SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
|           |             |                  |                                                           |                            |                                                                            |           |

| Table 4.3.6 | OMPS Limb Profiler Long Exposure Packet User Data Fields | (cont) |
|-------------|----------------------------------------------------------|--------|
|             |                                                          |        |

| Start Bit                | Bit<br>Size          | Mnemonic Name                                       | Description                                                                                                                                   | Units<br>OR<br>State Value        | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|--------------------------|----------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|----------------------------------------------------------------------------|-----------|
| 200                      | 3                    | M_MCSR_SPARE2                                       | Unused register bits                                                                                                                          | 0                                 | OPEN<br>CLOSED                                                             | U         |
| 203                      | 1                    | M_RES_ENABLE                                        | Resolver Circuitry Enable                                                                                                                     | 0                                 | DISABLED<br>ENABLED                                                        | U         |
| 204                      | 3                    | M_MCSR_SPARE1                                       | Unused register bits                                                                                                                          | 0                                 | OPEN<br>CLOSED                                                             | U         |
| 207                      | 1                    | M_MTR_RES_PWR                                       | Motor and Resolver Power State                                                                                                                | 0                                 | OFF                                                                        | U         |
| 208                      | 1                    | M_L_RESOLV_BUSY                                     | Limb Resolver Data Register - Busy                                                                                                            | 0                                 | NOT_BUSY<br>BUSY                                                           | U         |
| 209                      | 15                   | M L RESOLV SPARE                                    | Limb Resolver Data Register - Unused Bits                                                                                                     | N/A                               | N/A                                                                        | U         |
| 224                      | 16                   | M L RESOLV DATA                                     | Limb Resolver Data Register - Resolver Data                                                                                                   | N/A                               | N/A                                                                        | ŭ         |
| 240                      | 7                    | M_LMP_SPARE4                                        | Limb Motor Parameter Register - Unused Bits                                                                                                   | 0                                 | CW<br>CCW                                                                  | U         |
| 247                      | 1                    | M_L_DIRECTION                                       | Limb Motor Direction                                                                                                                          | 0                                 | CW<br>CCW                                                                  | U         |
| 248                      | 2                    | M_LMP_SPARE3                                        | Limb Motor Parameter Register - Unused Bits                                                                                                   | 0                                 | CW<br>CCW                                                                  | U         |
| 250                      | 2                    | M_L_SPEED                                           | Limb Motor Speed                                                                                                                              | 0<br>1<br>2<br>3                  | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252                      | 2                    | M_LMP_SPARE2                                        | Limb Motor Parameter Register - Unused Bits                                                                                                   | 0                                 | CW<br>CCW                                                                  | U         |
| 254                      | 2                    | M_L_PHASE                                           | Limb Motor Phase                                                                                                                              | 0<br>1<br>2<br>3                  | INVALID<br>A. MINUS, B. PLUS<br>A. MINUS, B. MINUS<br>A. PLUS, B. MINUS    | U         |
| 256                      | 4                    | M_LMP_SPARE1                                        | Limb Motor Parameter Register - Unused Bits                                                                                                   | 0<br>1                            | CW<br>CCW                                                                  | U         |
| 260                      | 12                   | M L STEP COUNT                                      | Limb Motor Step Count                                                                                                                         | N/A                               | N/A                                                                        | U         |
| 272                      | 8                    | M L RETRIES                                         | Limb Motor Retries                                                                                                                            | N/A                               | N/A                                                                        | U         |
| 280                      | 16                   | M L DESTINATION                                     | Limb Diffuser Move Destination                                                                                                                | N/A                               | N/A                                                                        | U         |
| 296                      | 16                   | M LP TEC SETPT                                      | Commanded LP TEC Setpoint                                                                                                                     | N/A                               | N/A                                                                        | U         |
| 312                      | 16                   | M LP HTR SETPT                                      | Commanded LP CCD Window Heater Setpoint                                                                                                       | N/A                               | N/A                                                                        | U         |
| 328                      | 16                   | M L POSITION                                        | Limb Diffuser Motor Position                                                                                                                  | N/A                               | N/A                                                                        | U         |
| 344                      | 8                    | M L POS ID                                          | Limb Diffuser Position ID                                                                                                                     | N/A                               | N/A                                                                        | U         |
| 352                      | 8                    | L TIM PAT VER                                       | Limb Active Timing Pattern Table Version Number major version                                                                                 | N/A                               | N/A                                                                        | U         |
| 360                      | 8                    | L TIM PAT VER                                       | Limb Active Timing Pattern Table Version Number minor version                                                                                 | N/A                               | N/A                                                                        | U         |
| 368                      | 16                   | L ROWS                                              | Rows of Limb Profiler CCD data                                                                                                                | N/A                               | N/A                                                                        | U         |
| 384                      | 16                   | L COLS                                              | Columns of Limb Profiler CCD data                                                                                                             | N/A                               | N/A                                                                        | U         |
| 400                      | 16                   | L IMG STATUS                                        | Limb Image Processing Status Word                                                                                                             | N/A                               | N/A                                                                        | U         |
| 416                      | 32                   | L INT HOLD TIME                                     | Limb TPG Integration Hold Time                                                                                                                | milliseconds                      | 0.1.0                                                                      | U         |
| 368<br>384<br>400<br>416 | 16<br>16<br>16<br>32 | L ROWS<br>L COLS<br>L IMG STATUS<br>L INT_HOLD_TIME | Rows of Limb Profiler CCD data     Columns of Limb Profiler CCD data     Limb Image Processing Status Word     Limb TPG Integration Hold Time | N/A<br>N/A<br>N/A<br>milliseconds | N/A<br>N/A<br>N/A<br>-, -, -, 0.1, 0                                       |           |
|                          |                      | DF                                                  |                                                                                                                                               |                                   |                                                                            |           |

| Table 4.3.6 OMPS Limb Profiler Lon | g Exposure Packet User Data Fields (cont) |
|------------------------------------|-------------------------------------------|
|------------------------------------|-------------------------------------------|

| Start Bit | art Bit Size Mnemonic Name Description |                 | Units<br>OR<br>State Value                                   | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type           |   |
|-----------|----------------------------------------|-----------------|--------------------------------------------------------------|----------------------------------------------------------------------------|---------------------|---|
| 448       | 8                                      | L PROFILE ID    | Active Limb Profile ID                                       | N/A                                                                        | N/A                 | U |
| 456       | 8                                      | L PROFILE VER   | Limb Imaging Profile Table Version Number major version      | N/A                                                                        | N/A                 | U |
| 464       | 8                                      | L PROFILE VER   | Limb Imaging Profile Table Version Number minor version      | N/A                                                                        | N/A                 | U |
| 472       | 16                                     | L TIM PAT TBL   | Limb Timing Pattern Table ID                                 | N/A                                                                        | N/A                 | U |
| 488       | 16                                     | L1 APID         | Limb Profiler Image #1 Application ID                        | N/A                                                                        | N/A                 | U |
| 504       | 16                                     | L2 APID         | Limb Profiler Image #2 Application ID                        | N/A                                                                        | N/A                 | U |
| 520       | 8                                      | L_LIN_CORR      | Limb Linearity Correction Flag                               | 0                                                                          | DISABLED<br>ENABLED | U |
| 528       | 16                                     | L LIN CORR TBL  | Limb Linearity Correction Table ID                           | N/A                                                                        | N/A                 | U |
| 544       | 16                                     | L FIXED COADDS  | Limb Fixed Coadd Count                                       | N/A                                                                        | N/A                 | Ű |
| 560       | 8                                      | L_REORDER_IMG   | Limb Reorder Image Flag                                      | 0                                                                          | DISABLED            | U |
| 568       | 8                                      | L_GAIN_CORR     | Limb Gain Correction Flag                                    | 0                                                                          | DISABLED<br>ENABLED | U |
| 576       | 16                                     | L GAIN CORR TBL | Limb Gain Correction Table ID                                | N/A                                                                        | N/A                 | U |
| 592       | 8                                      | L1_BIN_IMG      | Limb Profiler Image #1 Bin Image Flag                        | 0                                                                          | DISABLED<br>ENABLED | U |
| 600       | 16                                     | L1 SAMP TBL     | Limb Profiler Image #1 Sample Table ID                       | N/A                                                                        | N/A                 | U |
| 616       | 8                                      | L2_BIN_IMG      | Limb Profiler Image #2 Bin Image Flag                        | 0                                                                          | DISABLED<br>ENABLED | U |
| 624       | 16                                     | L2 SAMP TBL     | Limb Profiler Image #2 Sample Table ID                       | N/A                                                                        | N/A                 | U |
| 640       | 8                                      | L_2ND_IMAGE     | Limb Profiler Second Image Flag                              | 0                                                                          | FALSE<br>TRUE       | U |
| 648       | 8                                      | L GAIN TBL VER  | Limb Gain Table Version Number                               | N/A                                                                        | N/A                 | U |
| 656       | 8                                      | L GAIN TBL VER  | Limb Gain Table Version Number                               | N/A                                                                        | N/A                 | U |
| 664       | 8                                      | L LIN_TBL_VER   | Limb Linearity Correction Table Version Number major version | N/A                                                                        | N/A                 | U |
| 672       | 8                                      | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number minor version | N/A                                                                        | N/A                 | U |
| 680       | 8                                      | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number major version      | N/A                                                                        | N/A                 | U |
| 688       | 8                                      | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number minor version      | N/A                                                                        | N/A                 | U |
| 696       | 8                                      | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number major version      | N/A                                                                        | N/A                 | U |
| 704       | 8                                      | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number minor version      | N/A                                                                        | N/A                 | U |

Limb Image #1 Sample Table Version Ni Limb Image #2 Sample Table Version Ni Limb Image #2 Sample Table Version Ni

|--|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                         | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 740       | 40          | LA LAST ING DOV  | Time sterre of last and Link Image #0 (day of your) | N//A                       | N/A                                                                                                                                                                                                                                |           |
| 712       | 16          | L2_LAST_IMG_DOV  | Time stamp of last good Limb Image #2 (day of year) | N/A                        | N/A<br>N/A                                                                                                                                                                                                                         | 0         |
| 728       | 32          | L2_LAST_IMG_MSEC | Time stamp of last good Limb Image #2               | milliseconds               | N/A                                                                                                                                                                                                                                | <u> </u>  |
| 760       | 16          | L2_LAST_IMG_USEC | I the stamp of last good Limb Image #2              | microseconds               | N/A                                                                                                                                                                                                                                | <u> </u>  |
| 776       | 16          | M_I_CAL_LED      | Current in the active Calibration LED               | milliamps                  | -, -, -, 0.005086, 0                                                                                                                                                                                                               | S         |
| 792       | 16          | M_I_MIR_DRV_BD   | Temperature - Motor Driver Board                    | Celsius                    | -, -, -, 0.0484, -273.15                                                                                                                                                                                                           | S         |
| 808       | 16          | L_T_TELESCOPE    | Temperature - Limb Telescope                        | Celsius                    | 32/08 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 824       | 16          | L_T_PRISM_1      | Temperature - Limb Prism #1                         | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 840       | 16          | L_T_PRISM_2      | Temperature - Limb Prism #2                         | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, 1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 856       | 16          | L_T_CCD          | Temperature - Limb CCD                              | Celsius                    | -, -, -, -0.0238, 58.05                                                                                                                                                                                                            | S         |
| 872       | 16          | M_V_MTR_RES_5V   | Voltage - Motor/Resolver Electronics +5V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 888       | 16          | M_V_RES_12V      | Voltage - Resolver Electronics +12V                 | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 904       | 16          | M_V_RES_M12V     | Voltage - Resolver Electronics -12V                 | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 920       | 16          | L_T_MOTOR        | Temperature - Limb Diffuser Motor                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 936       | 16          | L_T_HOUSING      | Temperature - Limb Housing                          | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128,8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, 1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 952       | 16          | L_T_SUN_SIDE     | Temperature - Limb Sun Side                         | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, 1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 968       | 16          | L_T_DARK_SIDE    | Temperature - Limb Dark Side                        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 984       | 16          | L_T_COND_BAR     | Temperature - Limb Conductor Bar                    | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 1000      | 16          | L_T_WINDOW       | Temperature - Limb Window                           | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1016      | 16          | L_P_HTR_SET      | Power Setpoint - Limb CCD Window Heater             | Watts                      | -, -, -, 5.76E-8,0,0                                                                                                                                                                                                               | S         |
| 1032      | 16          | L_T_SIG_BD       | Temperature - Nadir Signal Board                    | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1048      | 16          | L_T_TIM_BD       | Temperature - Nadir Timing Board                    | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1064      | 1366784     | N/A              | CCD Data (42712 pixels x 32 bits/pixel)             | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 1367848   | 8           | N/A              | Pad Byte                                            | N/A                        | N/A                                                                                                                                                                                                                                | U         |
|           |             | DB.              |                                                     |                            |                                                                                                                                                                                                                                    |           |

Middle Packets 851968 106496

#### 4.3.7.1.4 Limb Profiler Short Exposure

The OMPS outputs the Limb Profiler Short (L2) Exposure data (APID 563) in one grouped packet containing 106 CCSDS packets. The first and middle packets are 1024 octets and the final packet is 110 octets. The packets are generated every 18.72 seconds. The structure of APID 563 is illustrated in Figure 4.3-15, Figure 4.3-16 and Figure 4.3-17. The user data fields are listed in Table 4.3.7.



# Figure 4.3-15 OMPS Limb Profiler Short Exposure First Packet Format

MIDDLE PACKET Qty. 104

|        |        |                   | PACKE           | T PRIMARY | HEADER            |                        |            | User Data Field            | 1      |       |
|--------|--------|-------------------|-----------------|-----------|-------------------|------------------------|------------|----------------------------|--------|-------|
|        | Verson | Packe             | t Identifi      | cation    | Packet            | Packet Sequence Packet |            | Science                    | 1      |       |
|        | No.    | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count      | Length     | CCD data<br>(middle)       | TOTAL  | TOTAL |
| Bits   | 3      | 1                 | 1               | 11        | 2                 | 14                     | 16         | 8144                       | 8192   |       |
| Octets |        |                   | 2               |           |                   | 2                      | 2          | 1018                       | 1024   |       |
| Value  | 000    | 0 /               | 0               | 0x233     | 00                | varies                 | 0x03F9     | varies                     |        |       |
|        |        |                   | Figure          | 4.3-16    | OMPS              | Limb Pi                | rofiler Sh | ort Exposure Middle Packet | Format |       |
|        |        | -                 |                 |           |                   |                        |            |                            |        |       |



Figure 4.3-17 OMPS Limb Profiler Short Exposure Last Packet Format

filer S.

| Start Bit                       | Bit                   | Mnemonic Name         Description         Units         Conversion Coefficients (formula or C5,C4,C3,C2,C1,C1) |                                                                                                                                                                                                                       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR | Data Type                                                   |        |
|---------------------------------|-----------------------|----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------|--------|
|                                 | Size                  |                                                                                                                |                                                                                                                                                                                                                       | State Value                                                  | State Name                                                  |        |
| 0                               | 16                    | CCSDS_RDR_VER                                                                                                  | Version Number of RDR                                                                                                                                                                                                 | N/A                                                          | N/A                                                         | U      |
| 16                              | 8                     | CCSDS_CONT_COUNT                                                                                               | Number of segmented CCSDS packet sequences - 1                                                                                                                                                                        | N/A                                                          | N/A                                                         | U      |
| 24                              | 8                     | CCSDS_CONT_FLAG                                                                                                | Indicates if this CCSDS packet begins an RDR                                                                                                                                                                          | N/A                                                          | N/A                                                         | U      |
| 32                              | 8                     | SENSOR_ID                                                                                                      | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                                                                                                                                                       | N/A                                                          | N/A<br>N/A                                                  | U      |
| 40                              | 8                     | ESW VERSION                                                                                                    | Flight Software Version Number (not for Dwell or FSW Bootup status) major version                                                                                                                                     | N/A<br>N/A                                                   | N/A<br>N/A                                                  | U<br>U |
|                                 |                       |                                                                                                                |                                                                                                                                                                                                                       | 0                                                            | As launched boot image                                      | Ű      |
| 56                              | 2                     | MER ROOT ING ID                                                                                                | Post Image Identifier (not for Dwell or ESW/ Postup status)                                                                                                                                                           | 1                                                            | Flight Modifiable                                           |        |
| 50                              | 2                     | MEB_BOOT_IMG_ID                                                                                                | Boot image identifier (not for Dwell of PSW Bootup status)                                                                                                                                                            | 2                                                            | Not used                                                    | U      |
|                                 |                       |                                                                                                                |                                                                                                                                                                                                                       | 3                                                            | Motorola Debug Monitor (TDMwhich we should never boot from) |        |
| 58                              | 5                     | MEB_SBC_ID                                                                                                     | Single Board Computer Identifier (not for Dwell or FSW Bootup status)                                                                                                                                                 | N/A                                                          | N/A<br>MER2                                                 | U      |
| 63                              | 1                     | MEB_SIDE                                                                                                       | Active MEB Side (not for Dwell or FSW Bootup status)                                                                                                                                                                  | 1                                                            | MEB2<br>MEB1                                                | U      |
| 64                              | 8                     | FSW_INIT_STATUS                                                                                                | Flight Software Initialization Status (not for Dwell or FSW Bootup status)                                                                                                                                            | 0                                                            | OK<br>EBBOB                                                 | U      |
| 72                              | 8                     | FSW INIT CODE                                                                                                  | Flight Software Initialization Code (not for Dwell or FSW Bootup status)                                                                                                                                              | N/A                                                          | N/A                                                         | U      |
| 80                              | 8                     |                                                                                                                | OMPS Protected State Indicator (not for Dwell or ESW Bootup status)                                                                                                                                                   | 1                                                            | PROTECTED                                                   |        |
| 80                              | 0                     | F3W_FROTECTED                                                                                                  | OWFS FIDECLED State Indicator (not for Dweir of FSW Bootup status)                                                                                                                                                    | 0                                                            | UNPROTECTED                                                 | 0      |
| 88                              | 4                     | MEB_FLASH_PWR                                                                                                  | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                                                                                                                                     | 0                                                            | OFF<br>ON                                                   | U      |
| 92                              | 4                     | EEPROM_SIDE                                                                                                    | EEPROM side used to boot                                                                                                                                                                                              | 0<br>1                                                       | Boot Side 1<br>Boot Side 2                                  | U      |
| 96                              | 7                     | M_MCR_SPARE6                                                                                                   | Unused bits of the Miscellaneous Control Register                                                                                                                                                                     | N/A                                                          | N/A                                                         | U      |
| 103                             | 1                     | M_MCR_L_SP_CTRL                                                                                                | Limb Signal Processing Spare Control                                                                                                                                                                                  | 0<br>1                                                       | OFF<br>ON                                                   | U      |
| 104                             | 3                     | M_MCR_SPARE5                                                                                                   | Unused bits of the Miscellaneous Control Register                                                                                                                                                                     | N/A                                                          | N/A                                                         | U      |
| 107                             | 1                     | M_MCR_N_SP_CTRL                                                                                                | Nadir Signal Processing Spare Control                                                                                                                                                                                 | 0<br>1                                                       | OFF<br>ON                                                   | U      |
| 108                             | 3                     | M_MCR_SPARE4                                                                                                   | Unused bits of the Miscellaneous Control Register                                                                                                                                                                     | N/A                                                          | N/A                                                         | U      |
| 111                             | 1                     | M_MCR_TEST_2                                                                                                   | Test connector                                                                                                                                                                                                        | 0<br>1                                                       | OFF<br>ON                                                   | U      |
| 112                             | 7                     | M_MCR_SPARE3                                                                                                   | Unused bits of the Miscellaneous Control Register                                                                                                                                                                     | N/A                                                          | N/A                                                         | U      |
| 119                             | 9                     | M_CAL_LED_STATE                                                                                                | State of the Calibration LEDs                                                                                                                                                                                         | 0<br>1                                                       | OFF<br>ON                                                   | U      |
| 128                             | 7                     | M_THCR_SPARE7                                                                                                  | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                             | N/A                                                          | N/A                                                         | U      |
| 135                             | 1                     | M_THCR_DAC_BUSY                                                                                                | State of the DACBUSY line                                                                                                                                                                                             | 0<br>1                                                       | NOT_BUSY<br>BUSY                                            | U      |
| 136                             | 3                     | M_THCR_SPARE6                                                                                                  | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                             | N/A                                                          | N/A                                                         | U      |
| 139                             | 1                     | M_TC_TEC_STATE                                                                                                 | State of the TC TEC Control                                                                                                                                                                                           | 0                                                            | OFF                                                         | U      |
| 140                             | 3                     | M_THCR_SPARE5                                                                                                  | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                             | N/A                                                          | N/A                                                         | U      |
| 143                             | 1                     | M_NP_TEC_STATE                                                                                                 | State of the NP TEC Control                                                                                                                                                                                           | 0                                                            | OFF                                                         | U      |
| 144                             | 3                     | M THCR SPARE4                                                                                                  | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                             | N/A                                                          | N/A                                                         | U      |
| 147                             | 1                     | M_LP_TEC_STATE                                                                                                 | State of the LP TEC Control                                                                                                                                                                                           | 0                                                            | OFF                                                         | U      |
| 148                             | 3                     | M THCR SPARE3                                                                                                  | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                             | N/A                                                          | N/A                                                         | U      |
| 151                             | 1                     | M_TC_HTR_STATE                                                                                                 | State of the TC CCD Window Heater Control                                                                                                                                                                             | 0                                                            | OFF                                                         | U      |
| 143<br>144<br>147<br>148<br>151 | 1<br>3<br>1<br>3<br>1 | M_NP_TEC_STATE<br>M_THCR_SPARE4<br>M_LP_TEC_STATE<br>M_THCR_SPARE3<br>M_TC_HTR_STATE                           | State of the NP TEC Control Unused bits of the TEC & Heater Control & Status Register State of the LP TEC Control Unused bits of the TEC & Heater Control & Status Register State of the TC CCD Window Heater Control | 0<br>1<br>N/A<br>0<br>1<br>N/A<br>0<br>1                     | OFF<br>ON<br>N/A<br>OFF<br>ON<br>N/A<br>OFF<br>ON           |        |

## Table 4.3.7 OMPS Limb Profiler Short Exposure Packet User Data Fields

| Start Bit | art Bit Size Mnemonic Name Description |                  | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|----------------------------------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3                                      | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1                                      | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3                                      | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1                                      | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 160       | 1                                      | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1                                      | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1                                      | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1                                      | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1                                      | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1                                      | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1                                      | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1                                      | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1                                      | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1                                      | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1                                      | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 171       | 1                                      | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 172       | 1                                      | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0                          | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 173       | 1                                      | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0                          | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1                                      | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0                          | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 175       | 1                                      | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0                          | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10                                     | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1                                      | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1                                      | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3                                      | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1                                      | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0                          | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3                                      | M_MCSR_SPARE4    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 195       | 1                                      | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3                                      | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1                                      | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |

| Table 4.3.7 | OMPS Limb Profile | r Short Exposure Packet | User Data Fields (cont) |
|-------------|-------------------|-------------------------|-------------------------|
|-------------|-------------------|-------------------------|-------------------------|

|           |             |                  |                                                               |                            | A                                                                          |           |
|-----------|-------------|------------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                | 0                          | OFF                                                                        | U         |
| 208       | 1           | M_L_RESOLV_BUSY  | Limb Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M L RESOLV SPARE | Limb Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_L_RESOLV_DATA  | Limb Resolver Data Register - Resolver Data                   | N/A_                       | N/A                                                                        | Ŭ         |
| 240       | 7           | M_LMP_SPARE4     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_L_DIRECTION    | Limb Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_LMP_SPARE3     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_L_SPEED        | Limb Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_LMP_SPARE2     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_L_PHASE        | Limb Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_LMP_SPARE1     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_L_STEP_COUNT   | Limb Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_L_RETRIES      | Limb Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_L_DESTINATION  | Limb Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_LP_TEC_SETPT   | Commanded LP TEC Setpoint                                     | N/A                        | N/A                                                                        | <u> </u>  |
| 312       | 16          | M_LP_HIR_SEIPI   | Commanded LP CCD Window Heater Setpoint                       | N/A                        | N/A                                                                        |           |
| 328       | 16          | M_L_POSITION     | Limb Diffuser Motor Position                                  | N/A                        | N/A                                                                        |           |
| 352       | 8           |                  | Limb Active Timing Pattern Table Version Number major version | N/A<br>N/A                 | N/A                                                                        |           |
| 360       | 8           |                  | Limb Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | - ŭ       |
| 368       | 16          | L ROWS           | Rows of Limb Profiler CCD data                                | N/A                        | N/A                                                                        | Ŭ         |
| 384       | 16          |                  | Columns of Limb Profiler CCD data                             | N/A                        | N/A                                                                        | Ŭ         |
| 400       | 16          | L IMG STATUS     | Limb Image Processing Status Word                             | N/A                        | N/A                                                                        | Ū         |
| 416       | 32          | L INT HOLD TIME  | Limb TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             |                  |                                                               |                            |                                                                            |           |
|           |             |                  |                                                               |                            |                                                                            |           |

| Table 4.3.7 | <b>OMPS Limb Profiler</b> | <b>Short Exposure Packet</b> | User Data Fields (cont) |
|-------------|---------------------------|------------------------------|-------------------------|
|-------------|---------------------------|------------------------------|-------------------------|

|           |             |                  |                                                              |                            | A                                                                          |           |
|-----------|-------------|------------------|--------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 448       | 8           | L PROFILE ID     | Active Limb Profile ID                                       | N/A                        | N/A                                                                        | U         |
| 456       | 8           | L PROFILE VER    | Limb Imaging Profile Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 464       | 8           | L PROFILE VER    | Limb Imaging Profile Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 472       | 16          | L TIM PAT TBL    | Limb Timing Pattern Table ID                                 | N/A                        | N/A                                                                        | U         |
| 488       | 16          | L1_APID          | Limb Profiler Image #1 Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | L2_APID          | Limb Profiler Image #2 Application ID                        | N/A                        | N/A                                                                        | U         |
| 520       | 8           | L_LIN_CORR       | Limb Linearity Correction Flag                               | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | L LIN CORR TBL   | Limb Linearity Correction Table ID                           | N/A                        | N/A                                                                        | U         |
| 544       | 16          | L FIXED COADDS   | Limb Fixed Coadd Count                                       | N/A                        | N/A                                                                        | Ű         |
| 560       | 8           | L_REORDER_IMG    | Limb Reorder Image Flag                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | L_GAIN_CORR      | Limb Gain Correction Flag                                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | L GAIN CORR TBL  | Limb Gain Correction Table ID                                | N/A                        | N/A                                                                        | U         |
| 592       | 8           | L1_BIN_IMG       | Limb Profiler Image #1 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | L1 SAMP TBL      | Limb Profiler Image #1 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 8           | L2_BIN_IMG       | Limb Profiler Image #2 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 624       | 16          | L2 SAMP TBL      | Limb Profiler Image #2 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 640       | 8           | L_2ND_IMAGE      | Limb Profiler Second Image Flag                              | 0<br>1                     | FALSE<br>TRUE                                                              | U         |
| 648       | 8           | L GAIN TBL VER   | Limb Gain Table Version Number major version                 | N/A                        | N/A                                                                        | U         |
| 656       | 8           | L GAIN TBL VER   | Limb Gain Table Version Number major version                 | N/A                        | N/A                                                                        | U         |
| 664       | 8           | L LIN TBL VER    | Limb Linearity Correction Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 672       | 8           | L_LIN_TBL_VER    | Limb Linearity Correction Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 680       | 8           | L1_SAMP_TBL_VER  | Limb Image #1 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 688       | 8           | L1_SAMP_TBL_VER  | Limb Image #1 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 696       | 8           | L2_SAMP_TBL_VER  | Limb Image #2 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 704       | 8           | L2_SAMP_TBL_VER  | Limb Image #2 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 712       | 16          | L1_LAST_IMG_DOY  | Time stamp of last good Limb Image #1 (day of year)          | N/A                        | N/A                                                                        | U         |
| 728       | 32          | L1_LAST_IMG_MSEC | Time stamp of last good Limb Image #1                        | milliseconds               | N/A                                                                        | U         |
| 760       | 16          | L1_LAST_IMG_USEC | Time stamp of last good Limb Image #1                        | microseconds               | N/A                                                                        | U         |
| 776       | 16          | M_I_CAL_LED      | Current in the active Calibration LED                        | milliamps                  | -, -, -, 0.005086,0                                                        | S         |
| 792       | 16          | M_T_MTR_DRV_BD   | Temperature - Motor Driver Board                             | Celsius                    | -, -, -, 0.0484, -273.15                                                   | S         |

\_\_\_\_\_\_ first good Time stamp of last good Current in the active Cali Temperature - Moor Dri

| Table 4.3.7 OMPS Limb Profiler Short Exposure Packet User Data Fields (cont) |  | Table 4.3.7 | <b>OMPS</b> Limb | <b>Profiler Short</b> | Exposure | Packet User | Data Fields | (cont) |
|------------------------------------------------------------------------------|--|-------------|------------------|-----------------------|----------|-------------|-------------|--------|
|------------------------------------------------------------------------------|--|-------------|------------------|-----------------------|----------|-------------|-------------|--------|

|           |             |                |                                          |                            | A.                                                                                                                                                                                                                                 |           |
|-----------|-------------|----------------|------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name  | Description                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type |
| 808       | 16          | L_T_TELESCOPE  | Temperature - Limb Telescope             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 824       | 16          | L_T_PRISM_1    | Temperature - Limb Prism #1              | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 840       | 16          | L_T_PRISM_2    | Temperature - Limb Prism #2              | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 856       | 16          | L T CCD        | Temperature - Limb CCD                   | Celsius                    | -, -, -, -, -, -0.0238, 58.05                                                                                                                                                                                                      | S         |
| 872       | 16          | M V MTR RES 5V | Voltage - Motor/Resolver Electronics +5V | Volts                      | -, -, -, 0.00311, 0                                                                                                                                                                                                                | S         |
| 888       | 16          | M V RES 12V    | Voltage - Resolver Electronics +12V      | Volts                      | -, -, -, 0.00311.0                                                                                                                                                                                                                 | S         |
| 904       | 16          | M V RES M12V   | Voltage - Resolver Electronics -12V      | Volts                      | 0.00311.0                                                                                                                                                                                                                          | S         |
| 920       | 16          | L_T_MOTOR      | Temperature - Limb Diffuser Motor        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                       | s         |
| 936       | 16          |                | Temperature - Limb Housing               | Celsius                    | 1796 to 32767: -, -, -1.044E-5, 4.081E-5, -0.087/2, 43.02<br>1796 to 32767: -, -, 9.53E-11, 1.817E-6, -0.01566, 7.7<br>-32768 to 83: -, -, 8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11 | s         |
| 052       | 16          |                | Tomporature Link Sup Side                | Coloiun                    | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7<br>-32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11 |           |
| 932       | 10          |                |                                          | Ceisius                    | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7<br>-32768 to 63: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                         |           |
| 968       | 16          | L_T_DARK_SIDE  | Temperature - Limb Dark Side             | Celsius                    | 84 to 343: -, -, -, 1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -, 1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                     | s         |
| 984       | 16          | L_T_COND_BAR   | Temperature - Limb Conductor Bar         | Celsius                    | -32/68 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1000      | 16          | L_T_WINDOW     | Temperature - Limb Window                | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1016      | 16          | L_P_HTR_SET    | Power Setpoint - Limb CCD Window Heater  | Watts                      | -, -, 5.76E-8,0,0                                                                                                                                                                                                                  | S         |
| 1032      | 16          | L_T_SIG_BD     | Temperature - Nadir Signal Board         | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1048      | 16          | L_T_TIM_BD     | Temperature - Nadir Timing Board         | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1064      | 854784      | N/A            | CCD Data (26712 pixels x 32 bits/pixel)  | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 855848    | 8           | N/A            | Pad Byte                                 | N/A                        | N/A                                                                                                                                                                                                                                | U         |
|           |             |                |                                          |                            |                                                                                                                                                                                                                                    |           |
|           |             |                |                                          |                            |                                                                                                                                                                                                                                    |           |

#### 21.3.7.2 Calibration Data

The OMPS has three calibration packet formats, one for each CCD. Each packet produced contains a single CCD image. During calibration orbits, the OMPS produces multiple packets of each type. Solar, linearity and dark current calibration measurements are made for each CCD. The solar images measure the spectral and radiometric response of the CCD. Each type of calibration requires multiple images of varying sizes. The quantity, size and duration of the calibration images is still being determined.

The weekly calibration of the OMPS instrument will take multiple orbits to complete. Limb Sensor calibrations start between the descending node and the South Pole when the Limb diffuser is illuminated by the Sun. Nadir Sensor calibrations begin before the sensor would normally be turned off (t1 in Figure 4.3-3). Because the diffuser takes up only a portion of the total Nadir Column field of view, seven overlapping images are necessary to complete the Nadir Column radiometric/spectral calibration. The Nadir Profiler radiometric/spectral calibration is obtained when the diffuser is in the middle position of the seven Nadir Column images. Dark current and two linearity images for each spectrometer/CCD follow when the OMPS is in the shadow of the Earth.

The structure of the calibration packets is described in the following subsections.

#### 4.3.7.2.1 Nadir Total Column Calibration

The OMPS produces Nadir Total Column Calibration packets in APID 564. Solar, linearity and dark current calibrations are performed in a single orbit every week. Because the solar, linearity and dark current calibrations require different image sizes, the structure of APID 564 is illustrated as a variable-sized grouped packet in Figure 4.3-18, Figure 4.3-19, Figure 4.3-20 and Figure 4.3-21. It is possible but not expected for APID 564 to be a single standalone packet. The maximum size of a packet with a single image is included in the footnotes to Table 4.3.1. Since a maximum-sized packet will span multiple grouped packets, the first packet of a continuation grouped packet is shown in Figure 4.3-21. The user data fields are listed in Table 4.3.8 assuming there is a single grouped packet.

| FIRST PACK | ET, first             | group            |                    |         |                   |                     |                  |                     |                        |                  |                                  |                      | 4                   |                       |                        |                      |                                     |                     |                 |
|------------|-----------------------|------------------|--------------------|---------|-------------------|---------------------|------------------|---------------------|------------------------|------------------|----------------------------------|----------------------|---------------------|-----------------------|------------------------|----------------------|-------------------------------------|---------------------|-----------------|
| [          | PACKET PRIMARY HEADER |                  |                    |         |                   |                     |                  |                     | CONDARY HEA            | DER              |                                  |                      |                     | User D                | ata Field              |                      |                                     |                     |                 |
|            | Verson                | Pac              | ket Identif:       | ication | Packet            | Sequence            | Packet           | Start of            | Packets                | Spare            |                                  | OMPS Head            | er                  | Er                    | ngineering             | Data                 | Scier                               | nce                 |                 |
|            | No.                   | Type<br>Indicate | Sec Hdr<br>or Flag | APID    | Sequence<br>Flags | Sequence<br>Count   | Length           | Scan                | in RDR<br>- 1          |                  | RDR<br>Version                   | Cont<br>Count<br>-1  | Cont Flag           | Engine                | ering Data             | Sections             | HW Start Tag<br>(if not<br>sampled) | CCD data<br>(start) | τοται           |
| Bits       | 3                     | 1                | 1                  | 11      | 2                 | 14                  | 16               | 64                  | 8                      | 8                | 16                               | 8                    | 8                   |                       | 1208                   |                      | 32                                  | varies              | 8192            |
| Octets     |                       | . 1              | 2                  |         |                   | 2                   | 2                | 8                   | 1                      | 1                | 2                                | 1                    | 1                   |                       | 151                    |                      | 4                                   | varies              | 1024            |
| Value      | 000                   | 0                | 1                  | 0x234   | 01                | varies              | 0x03F9           | varies              | varies                 | 0x00             | varies                           | varies               | varies              |                       | / varies               |                      | varies                              | varies              |                 |
|            |                       |                  |                    |         | econdary          | -                   |                  |                     |                        |                  |                                  |                      |                     |                       |                        |                      |                                     |                     |                 |
|            | Telemetry Packet      |                  |                    |         |                   |                     | Engineering Data |                     |                        |                  |                                  |                      |                     |                       |                        |                      |                                     |                     |                 |
|            |                       |                  |                    |         |                   | Sensor_In<br>fo (7) | Mech_SD<br>(59)  | Mech_Nadi<br>r (62) | Mech_Nadi<br>r_SD (73) | Nadir_SD<br>(71) | Nadir_IMG<br>Profile_<br>SD (50) | Nadir_TC_<br>SD (66) | Curr_LED_SD<br>(26) | Temp_Mech_S<br>D (30) | Temp_Nadi<br>r_SD (28) | Volt_Mech_SD<br>(42) | Temp_Nadir<br>(24)                  | Temp_NP<br>(36)     | Temp_TC<br>(35) |
|            |                       |                  |                    |         |                   | 64                  | 112              | 88                  | 88                     | 64               | 360                              | 96                   | 16                  | 16                    | 48                     | 48                   | 176                                 | 16                  | 16              |
|            |                       |                  |                    |         |                   | 8                   | 14               | 11                  | 11                     | 8                | 45                               | 12                   | 2                   | 2                     | 6                      | 6                    | 22                                  | 2                   | 2               |
|            |                       |                  |                    |         |                   | varies              | varies           | varies              | varies                 | varies           | varies                           | zeros                | varies              | varies                | varies                 | varies               | varies                              | varies              | varies          |



MIDDLE PACKET



#### Figure 4.3-19 OMPS Grouped Nadir Total Column Calibration Middle Packet Format

LAST PACKET

|        |              |                   | PACKE           | T PRIMARY              | HEADER            |                   |        | User Data Field   | 3                                 |                               |        |
|--------|--------------|-------------------|-----------------|------------------------|-------------------|-------------------|--------|-------------------|-----------------------------------|-------------------------------|--------|
|        | Verson       | Packe             | t Identifi      | ification Packet Seque |                   |                   | Packet | Science           |                                   |                               |        |
|        | No.          | Type<br>Indicator | Sec Hdr<br>Flag | APID                   | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | HW End Tag<br>(if not<br>sampled) | Pad Byte<br>(if<br>necessary) |        |
|        |              |                   |                 |                        |                   |                   |        |                   |                                   |                               | TOTAL  |
| Bits   | 3            | 1                 | 1               | 11                     | 2                 | 14                | 16     | varies            | 32                                | 8                             | varies |
| Octets |              |                   | 2               |                        |                   | 2                 | 2      | varies            | 4                                 | 1                             | varies |
| Value  | 000          | 0 /               | 0               | 0x234                  | 10                | varies            | varies | varies            | varies                            | fixed                         |        |
| Те     | lemetry Pack | et                |                 |                        |                   | Last              | Packet | A BREE            |                                   |                               | -      |

# Figure 4.3-20 OMPS Grouped Nadir Total Column Calibration Last Packet Format

FIRST PACKET of a group, but not of the f

|        |        |           | PACKE      | T PRIMARY | HEADER   |          |        | SEC      | CONDARY HEA | ADER  | User Data Field |            |           |          |      |
|--------|--------|-----------|------------|-----------|----------|----------|--------|----------|-------------|-------|-----------------|------------|-----------|----------|------|
|        | Verson | Packe     | t Identifi | cation    | Packet S | Sequence | Packet | Start of | Packets     | Spare |                 | OMPS Heade | r         | Science  |      |
|        | No.    | Туре      | Sec Hdr    | APID      | Sequence | Sequence | Length | Scan     | in RDR      |       | RDR             | Cont       | Cont Flag | CCD data |      |
|        |        | Indicator | Flag       |           | Flags    | Count    |        |          | - 1         |       | Version         | Count      |           | (middle) | TOTA |
|        |        |           |            |           |          |          |        |          |             |       |                 | -1         |           |          | 1014 |
| Bits   | 3      | 1         | 1          | 11        | 2        | 14       | 16     | 64       | 8           | 8     | 16              | 8          | 8         | 8032     | 8192 |
| Octets |        |           | 2          |           |          | 2        | 2      | 8        | 1           | 1     | 2               | 1          | 1         | 1004     | 1024 |
| Value  | 000    | , 0       | 1          | 0x234     | 01       | varies   | 0x03F9 | varies   | varies      | 0x0   | varies          | varies     | varies    | varies   |      |
|        |        |           |            |           |          |          |        |          |             |       |                 |            |           | ·        |      |



# Figure 4.3-21 OMPS Grouped Nadir Total Column Calibration First Packet Format

| Table 4.3.8 OMPS N | ladir Total Column | <b>Calibration Packe</b> | t User Data Fields |
|--------------------|--------------------|--------------------------|--------------------|
|--------------------|--------------------|--------------------------|--------------------|

| 0         16         CCSDS RDF VER<br>Count         Ware         NA         NA           15         &         CCSDS CONT_COUNT         Number of segments CCSDS packet sequences -1         N/A         N/A           24         8         CCSDS CONT_COUNT         Number of segments CCSDS packet sequences -1         N/A         N/A           24         8         CCSDS CONT_COUNT         Number of segments CCSDS packet sequences -1         N/A         N/A           24         8         CCSDS CONT_COUNT         Fight Software Version Number of the Deel of FSW Bootup satus)         N/A         N/A           40         8         FSW VERSION         Fight Software Version Number of the Deel of FSW Bootup satus)         N/A         N/A           41         8         FSW VERSION         Fight Software Version Number of the Deel of FSW Bootup satus)         1         N/A         N/A           55         MEB_BOOT_IMG_ID         Boot Image Identifier (not for Deel or FSW Bootup satus)         1         N/A         N/A           63         1         MEB_SBC_ID         Single Board Computer Identifier (not for Deel or FSW Bootup satus)         1         Mitroia Debug Monitor (TOM-witroin MeBord Inform)           64         8         FSW_INT_STATUS         Fight Software Infalazion Cootin for Devel or FSW Bootup satus)         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | )ata Type |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 16     8     CCSDS CONT COUNT     Number of segmented CCSDS packet begins and RDP     NA     NA       24     8     CCSDS CONT FLAG     Outmaches rink CCSDS packet begins and RDP     NA     NA       3     8     SUBSERID     Outmaches rink CCSDS packet begins and RDP     NA     NA       34     8     SUBSERID     Flight Software Version Number of segmented (rot for Dwell or FSW Bootup status)     NA     NA       48     8     FSW_VERSION     Flight Software Version Number (rot for Dwell or FSW Bootup status)     1     Flight Molffalde       56     2     MEB_BOOT_IMG_ID     Boot Image Identifier (rot for Dwell or FSW Bootup status)     1     NA     NA       58     5     MEB_SOE     Active MEB Sile (rot for Dwell or FSW Bootup status)     1     MeBrain       58     1     MEB_SOE     Active MEB Sile (rot for Dwell or FSW Bootup status)     0     MeBrain       54     6     FSW_INT_CSTATUS     Flight Software Initialization Code (rot for Dwell or FSW Bootup status)     1     MEBrain       72     8     FSW_INT_CODE     Flight Software Initialization Code (rot for Dwell or FSW Bootup status)     0     UNPROTECTED       84     4     MEB_LLASH, PWR     SBC Flight Software Initialization Code (rot for Dwell or FSW Bootup status)     1     UNPROTECTED       72     8 <td>U</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | U         |
| A     B     CLEASERNOR ID     DATE       40     6     FSW VERSION     Filint Solvers of the basis of the ba |           |
| 40       8       FSW VERSION       Flight Software Version Number (not for Dwell or FSW Bootup status) - minor version       N/A       N/A         48       6       PSW, VERSION       Flight Software Version Number (not for Dwell or FSW Bootup status) - minor version       N/A       N/A         56       2       MEB_BOOT_IMG_ID       Boot Image Identifier (not for Dwell or FSW Bootup status)       0       As launched boot Image         58       5       MEB_SEC ID       Single Board Computer Identifier (not for Dwell or FSW Bootup status)       N/A       N/A         63       1       MEB_SIDE       Active MEB side (not for Dwell or FSW Bootup status)       N/A       MEB2         64       8       FSW_INIT_STATUS       Flight Software Initialization Status (not for Dwell or FSW Bootup status)       0       MEB2         64       8       FSW_INIT_CODE       Flight Software Initialization Code (not for Dwell or FSW Bootup status)       1       OK         80       8       FSW_INIT_CODE       Flight Software Initialization Code (not for Dwell or FSW Bootup status)       1       UMRCTECTED         92       4       EEPROM_Stote       EEPROM stell action (not for Dwell or FSW Bootup status)       1       UMRCTECTED         93       7       M.CR.SPARE6       Unused bis of the Miscellaneous Control Register       N/A       N/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |
| Heat     8     FSW_VERSION     Flight Software Version Number (not for Dwell or FSW Boolup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <u> </u>  |
| 56         2         MEB_BOOT_IMG_ID         Boot Image identifier (not for Dwell or FSW Bootup status)         0         As launched boot image<br>Not used           58         5         MEB_SOC_ID         Single Board Computer Identifier (not for Dwell or FSW Bootup status)         N/A         N/A           63         1         MEB_SIDE         Active MEB Side (not for Dwell or FSW Bootup status)         N/A         N/A           64         8         FSW_INIT_STATUS         Flight Software Initialization Status (not for Dwell or FSW Bootup status)         0         MEE91           72         8         FSW_INIT_CODE         Flight Software Initialization Status (not for Dwell or FSW Bootup status)         N/A         PRAC           80         8         FSW_PROTECTED         OMPS Protected State Indicator (not for Dwell or FSW Bootup status)         0         UNPROTECTED           88         4         MEB_FLASH_PWR         SBC Flash Memory Power State (not for Dwell or FSW Bootup status)         0         ON           92         4         EEPROM_SIDE         EEPROM side (not for Dwell or FSW Bootup status)         0         ON           103         1         M.CR_SPARE6         Unused bits of the Miscellaneous Control Register         N/A         N/A           103         1         M.MCR_SPARE4         Unused bits of the Miscellaneous Con                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | U         |
| 58     5     MEB SBC ID     Single Board Computer Identifier (not for Dwell or FSW Bootup status)     NA     NA       63     1     MEB_SIDE     Active MEB Side (not for Dwell or FSW Bootup status)     0     MEB1       64     8     FSW_INIT_STATUS     Flight Software Initialization (stor for Dwell or FSW Bootup status)     0     0     MEB2       72     8     FSW_INIT_CODE     Flight Software Initialization Code (not for Dwell or FSW Bootup status)     NA     NA       80     8     FSW_PROTECTED     OMPS Protected State Indicator (not for Dwell or FSW Bootup status)     0     0     NA       80     8     FSW_PROTECTED     OMPS Protected State Indicator (not for Dwell or FSW Bootup status)     0     0     0       84     4     MEB_FLASH_PWR     SEC Flash Memory Power State (not for Dwell or FSW Bootup status)     0     0     0       92     4     EEPROM_SIDE     EEPROM side used to boot     1     Boot Side 2       96     7     M_MCR_SPARE6     Unused bits of the Miscellaneous Control Register     N/A     N/A       103     1     M_MCR_SPARE5     Unused bits of the Miscellaneous Control Register     N/A     N/A       107     1     M_MCR_SPARE5     Unused bits of the Miscellaneous Control Register     N/A     N/A       101     1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | U         |
| 631MEB_SIDEActive MEB Side (not for Dwell or FSW Bootup status)0MEB2648FSW_INIT_STATUSFlight Software Initialization Status (not for Dwell or FSW Bootup status)0OK728FSW_INIT_CODEFlight Software Initialization Code (not for Dwell or FSW Bootup status)NANA808FSW_PROTECTEDOMPS Protected State Indicator (not for Dwell or FSW Bootup status)NANA808FSW_PROTECTEDOMPS Protected State Indicator (not for Dwell or FSW Bootup status)0UNPROTECTED884MEB_FLASH_PWRSBC Flash Memory Power State (not for Dwell or FSW Bootup status)1UNPROTECTED924EEPROM_SIDEEEPROM side used to boot0Boot Side 1967M.MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_LSP_CTRLLimb Signal Processing Spare Control1ON1043M.MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the TEC & Heater Control & S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | U         |
| 64         8         FSW_INIT_STATUS         Flight Software Initialization Status (not for Dwell or FSW Bootup status)         0         OK           72         8         FSW_INIT_CODE         Flight Software Initialization Code (not for Dwell or FSW Bootup status)         N/A         N/A           80         8         FSW_PROTECTED         OMPS Protected State Indicator (not for Dwell or FSW Bootup status)         0         OPF           88         4         MEB_FLASH_PWR         SBC Flash Memory Power State (not for Dwell or FSW Bootup status)         0         OPF           92         4         EEPROM_SIDE         EEPROM side used to boot         0         OPF           96         7         M_MCR_SPARE6         Unused bits of the Miscellaneous Control Register         N/A         N/A           103         1         M_MCR_LSP_CTRL         Limb Signal Processing Spare Control         0         OFF           104         3         M_MCR_SPARE4         Unused bits of the Miscellaneous Control Register         N/A         N/A           107         1         M_MCR_SPARE4         Unused bits of the Miscellaneous Control Register         N/A         OF           108         3         M_MCR_SPARE4         Unused bits of the Miscellaneous Control Register         N/A         ON           111                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U         |
| 728FSW_INIT_CODEFlight Software Initialization Code (not for Dwell or FSW Bootup status)N/ANA808FSW_PROTECTEDOMPS Protected State Indicator (not for Dwell or FSW Bootup status)00884MEB_FLASH_PWRSBC Flash Memory Power State (not for Dwell or FSW Bootup status)00924EEPROM_SIDEEEPROM side used to boot0Boot Side 1967M_MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_LSP_CTRLLimb Signal Processing Spare Control0OFF1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_TSPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TSPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector0OFF1127M_MCR SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs0OFF1287M_THCR_DAC_BUSYState of the Calibration LEDs0NOTBUSY1351M_THCR_DAC_BUSPState of the DACBUSY line0NOTBUSY1362M_THCR_SPARE5Unused bits of the DACBUSY line </td <td>U</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | U         |
| 808FSW_PROTECTEDOMPS Protected State Indicator (not for Dwell or FSW Bootup status)1PROTECTED<br>UNPROTECTED884MEB_FLASH_PWRSBC Flash Memory Power State (not for Dwell or FSW Bootup status)00OFF924EEPROM_SIDEEEPROM side used to boot01Boot Side 1967M_MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs1ON1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | U         |
| 884MEB_FLASH_PWRSBC Flash Memory Power State (not for Dwell or FSW Bootup status)0OFF<br>ON924EEPROM_SIDEEEPROM side used to boot0Boot Side 1<br>Dot Side 2967M MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_L_SP_CTRLLimb Signal Processing Spare Control0OFF1043M MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_N_SP_CTRLNadir Signal Processing Spare Control0OFF1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs1OFF1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_SPARE6Unused bits of the DACBUSY line1BUSY1362M_THCR_SPARE6Unused bits of the DACBUSY line1BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | U         |
| 924EEPROM_SIDEEEPROM side used to boot0<br>1Boot Side 1<br>Boot Side 2967M_MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_LSP_CTRLLimb Signal Processing Spare Control0OFF1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_N_SP_CTRLUnused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_N_SP_CTRLNadir Signal Processing Spare Control0OFF1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector0OFF1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs1ON1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_DAC_BUSYState of the DACBUSY line0NOT_BUSY1362M_THCR_BRARE5Unused bits of the DACBUSY line1BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | U         |
| 967M_MCR_SPARE6Unused bits of the Miscellaneous Control RegisterN/AN/A1031M_MCR_LSP_CTRLLimb Signal Processing Spare Control0OFF1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_NSP_CTRLNadir Signal Processing Spare Control0OFF1071M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AON1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector0OFF1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs1ON1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_DAC_BUSYState of the DACBUSY line0NOT_BUSY1362M_THCR_SPARE5Unused bits of the DACBUSY line1BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | U         |
| 1031M_MCR_L_SP_CTRLLimb Signal Processing Spare Control0OFF1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_N_SP_CTRLNadir Signal Processing Spare Control0OFF1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector0OFF1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs1OFF1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_DAG_BUSYState of the DACBUSY line0NOT_BUSY1362M_TUCR_SPARE4Unused bits of the AcabuSY line1BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | U         |
| 1043M_MCR_SPARE5Unused bits of the Miscellaneous Control RegisterN/AN/A1071M_MCR_N_SP_CTRLNadir Signal Processing Spare Control0OFF1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector1OFF1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CCAL_LED_STATEState of the Calibration LEDs1OFF1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_DAC_BUSYState of the CALSY line0NOT_BUSY1362M_TUCR_SPARE5Unused bits of the CS & Status Control & Status RegisterN/AN/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | U         |
| 1071M_MCR_N_SP_CTRLNadir Signal Processing Spare Control0OFF1083M_MCR_SPARE4Unused bits of the Miscellaneous Control RegisterN/AN/A1111M_MCR_TEST_2Test connector0OFF1127M_MCR_SPARE3Unused bits of the Miscellaneous Control RegisterN/AN/A1199M_CAL_LED_STATEState of the Calibration LEDs0OFF1287M_THCR_SPARE7Unused bits of the TEC & Heater Control & Status RegisterN/AN/A1351M_THCR_DAC_BUSYState of the DACBUSY line0NOT_BUSY1262M_THCR_SPARE5Unused bits of the TEC & Heater Control & Status RegisterN/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | U         |
| 108       3       M MCR_SPARE4       Unused bits of the Miscellaneous Control Register       N/A       N/A         111       1       M_MCR_TEST_2       Test connector       0       OFF         111       1       M_MCR_SPARE3       Unused bits of the Miscellaneous Control Register       N/A       ON         112       7       M_MCR_SPARE3       Unused bits of the Miscellaneous Control Register       N/A       N/A         119       9       M_CCAL_LED_STATE       State of the Calibration LEDs       0       OFF         128       7       M_THCR_SPARE7       Unused bits of the TEC & Heater Control & Status Register       N/A       N/A         138       7       M_THCR_DAC_BUSY       State of the DACBUSY line       0       NOT_BUSY         135       1       M_THCR_DAC_BUSY       State of the CABUSY line       1       BUSY         136       2       M_TUCR_SPARE4       Unused bits of the CC & Heater Control & Status Register       N/A       NOT_BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | U         |
| 111     1     M_MCR_TEST_2     Test connector     0     0FF       112     7     M_MCR_SPARE3     Unused bits of the Miscellaneous Control Register     N/A     N/A       119     9     M_CAL_LED_STATE     State of the Calibration LEDs     0     0FF       128     7     M_THCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     N/A     N/A       135     1     M_THCR_DAC_BUSY     State of the DACBUSY line     0     NOT_BUSY       136     2     M_THCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | U         |
| 112     7     M MCR_SPARE3     Unused bits of the Miscellaneous Control Register     N/A     N/A       119     9     M_CAL_LED_STATE     State of the Calibration LEDs     0     OFF       128     7     M THCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     N/A     N/A       135     1     M_THCR_DAC_BUSY     State of the DACBUSY line     0     NOT_BUSY       136     2     M_THCR_SPARE7     Unused bits of the TCC & Heater Control & Status Register     N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | U         |
| 119     9     M_CAL_LED_STATE     State of the Calibration LEDs     0     OPF       128     7     M_THCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     N/A     N/A       135     1     M_THCR_DAC_BUSY     State of the DACBUSY line     0     NOT_BUSY       136     2     M_TUCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     1/4     BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <u> </u>  |
| 128     7     M_THCR_SPARE7     Unused bits of the TEC & Heater Control & Status Register     N/A     N/A       135     1     M_THCR_DAC_BUSY     State of the DACBUSY line     0     NOT_BUSY       136     2     M_THCR_SPARE6     Linuxed bits of the TEC & Heater Control & Status Register     N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | U         |
| 135     1     M_THCR_DAC_BUSY     State of the DACBUSY line     0     NO1_DOST       136     2     M_THCR_DAC_BUSY     State of the DACBUSY line     1     BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |
| 122 2 M THCB_CDADEG Housed bits of the TEC 9 Heater Control 9 October Desister                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | U         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U         |
| 139         1         M_TC_TEC_STATE         State of the TC TEC Control         0         OFF           001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001         001 <td< td=""><td>U</td></td<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | U         |
| 140 3 M THCR SPARE5 Unused bits of the TEC & Heater Control & Status Register N/A N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | U         |
| 143         1         M_NP_TEC_STATE         State of the NP TEC Control         0         OFF           143         1         M_NP_TEC_STATE         5         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U         |
| 144 3 M_THCR_SPARE4 Unused bits of the TEC & Heater Control & Status Register N/A N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | U         |
| 147         1         M_LP_TEC_STATE         State of the LP TEC Control         0         OFF           147         1         M_LP_TEC_STATE         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U         |
| 148 3 M_THCR_SPARE3 Unused bits of the TEC & Heater Control & Status Register N/A N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | U         |
| 151         1         M_TC_HTR_STATE         State of the TC CCD Window Heater Control         0         OFF           151         1         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | U         |

| Table 4.3.8 OMPS Nadir Total Column Calibration Packet User Data Fields (con | it) |
|------------------------------------------------------------------------------|-----|
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| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A<br>OFF                                                                 | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 1                          | ON                                                                         | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A<br>OFF                                                                 | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 1                          | ON                                                                         | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              | U         |
|           |             | - DBA            |                                                           |                            |                                                                            |           |

| Table 4.3.8 OMPS Nadir Total Column Calibration Packet User Data Fields (con- | t) |
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| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0                          | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M_N_RESOLV_SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A<br>N/A                                                                 | U         |
| 224       | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0                          |                                                                            | U         |
| 247       | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CCW<br>CW                                                                  | U         |
| 248       | 2           | M NMP SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CCW<br>CW                                                                  | U         |
| 250       | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 1<br>0<br>1<br>2<br>3      | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           |                  | Nadir Motor Retries                                            | N/A                        | N/A                                                                        |           |
| 296       | 16          |                  | Commanded TC TEC Setpoint                                      | N/A<br>N/A                 | N/A                                                                        |           |
| 312       | 16          | M TC HTR SETPT   | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | Ŭ         |
| 328       | 16          | M NP TEC SETPT   | Commanded NP TEC Setpoint                                      | N/A                        | N/A                                                                        | Ū         |
| 344       | 16          | M NP HTR SETPT   | Commanded NP CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | Ū         |
| 360       | 16          | M_N_POSITION     | Nadir Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 376       | 8           | M_N_POS_ID       | Nadir Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 384       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 392       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 400       | 16          | N_IMG_STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                        | U         |
|           |             |                  | CHOILOR                                                        |                            |                                                                            |           |
|           |             | Die.             |                                                                |                            |                                                                            |           |
| Table 4.3.8 OMPS Nadir Total Column | Calibration Packet User Data Fields (cont) |
|-------------------------------------|--------------------------------------------|
|-------------------------------------|--------------------------------------------|

|           |      |                  |                                                          |             | A                                                      |           |
|-----------|------|------------------|----------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
|           |      |                  |                                                          | Units       | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
| Start Bit | Bit  | Mnemonic Name    | Description                                              | OR          | OR                                                     | Data Type |
|           | Size |                  |                                                          | State Value | State Name                                             |           |
| 448       | 8    |                  | Active Nadir Profile ID                                  | N/A         | N/A                                                    | U         |
| 456       | 8    |                  | Nadir Imaging Profile Table Version Number major version | N/A         | N/A                                                    | ŭ         |
| 464       | 8    | N PROFILE VER    | Nadir Imaging Profile Table Version Number minor version | N/A         | N/A                                                    | Ū         |
| 472       | 16   | N TIM PAT TBL    | Nadir Timing Pattern Table ID                            | N/A         | N/A                                                    | U         |
| 488       | 16   | TC_APID          | Nadir Total Column Application ID                        | N/A         | N/A                                                    | U         |
| 504       | 16   | NP_APID          | Nadir Profiler Application ID                            | N/A         | N/A                                                    | U         |
| 520       | 8    | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 0<br>1      | DISABLED                                               | U         |
| 528       | 16   | TC LIN CORR TBL  | Nadir Total Column Linearity Correction Table ID         | N/A         | N/A                                                    | U         |
| 544       | 16   | TC_FIXED_COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A         | N/A                                                    | U         |
| 560       | 8    | TC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 0           | DISABLED<br>ENABLED                                    | U         |
| 568       | 8    | TC_GAIN_CORR     | Nadir Total Column Gain Correction Flag                  | 0           | DISABLED                                               | U         |
| 576       | 16   | TC GAIN CORR TBI | Nadir Total Column Gain Correction Table ID              | N/A         | N/A                                                    |           |
| 0/0       | 10   |                  |                                                          | 0           | DISABI ED                                              |           |
| 592       | 8    | TC_BIN_IMG       | Nadir Total Column Bin Image Flag                        | 1           | ENABLED                                                | U         |
| 600       | 16   | TC SAMP TBL      | Nadir Total Column Sample Table ID                       | N/A         | N/A                                                    | U         |
| 616       | 8    | NP_LIN_CORR      | Nadir Profiler Linearity Correction Flag                 | 0           | DISABLED                                               | U         |
| 624       | 16   | NP LIN CORR TBI  | Nadir Profiler Linearity Correction Table ID             | N/A         |                                                        |           |
| 640       | 16   |                  | Nadir Profiler Eineanty Contection Fable 15              | N/A         | N/A                                                    | <u> </u>  |
| 040       | 10   |                  |                                                          | 0           | DISABLED                                               |           |
| 656       | 8    | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 1           | ENABLED                                                | U         |
| 664       | 8    | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 0           | DISABLED<br>ENABLED                                    | U         |
| 672       | 16   | NP_GAIN_CORR_TBL | Nadir Profilier Gain Correction Table ID                 | N/A         | N/A                                                    | U         |
| 600       | 0    | ND BIN IMC       | Nodis Brefilies Bin Image Flag                           | 0           | DISABLED                                               |           |
| 000       | 0    | NP_BIN_IMG       | Nadir Profilier Bin finage Plag                          | 1           | ENABLED                                                | U         |
| 696       | 8    | NP_SAMP_TBL      | Nadir Profilier Sample Table ID major version            | N/A         | N/A                                                    | U         |
| 704       | 8    | NP_SAMP_TBL      | Nadir Profilier Sample Table ID minor version            | N/A         | N/A                                                    | U         |
| 712       | 8    | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version major version      | N/A         | N/A                                                    | U         |
| 720       | 8    | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version minor version      | N/A         | N/A                                                    | U         |
| 728       | 8    | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A         | N/A                                                    | 0         |
| 730       | 8    |                  | Nadir Profiler Gain Table Version minor version          | N/A         | N/A                                                    |           |
| 744       | 0    |                  | Nadir Total Column Linearity Table Version major version | N/A<br>N/A  | N/A                                                    |           |
| 760       | 8    |                  | Nadir Profiler Linearity Table Version maior version     | N/A         | N/A                                                    | <u> </u>  |
| 768       | 8    |                  | Nadir Profiler Linearity Table Version major version     | N/A         | N/A                                                    | <u> </u>  |
| 776       | 8    | TC SAMP TBL VER  | Nadir Total Column Sample Table Version major version    | N/A         | N/A                                                    | ŭ         |
| 784       | 8    | TC SAMP TBL VER  | Nadir Total Column Sample Table Version minor version    | N/A         | N/A                                                    | Ŭ         |
| 792       | 8    | NP SAMP TBL VER  | Nadir Profiler Sample Table Version major version        | N/A         | N/A                                                    | Ū         |
| 800       | 8    | NP SAMP TBL VER  | Nadir Profiler Sample Table Version minor version        | N/A         | N/A                                                    | U         |
|           |      |                  | CHOIP IN                                                 |             |                                                        |           |
|           |      | Are              |                                                          |             |                                                        |           |

# Table 4.3.8 OMPS Nadir Total Column Calibration Packet User Data Fields (cont)

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type |
|-----------|-------------|------------------|------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 808       | 16          | TC ROWS          | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                | U U       |
| 824       | 16          | TC COLS          | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                | Ū         |
| 840       | 16          | TC LAST IMG DOY  | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                | Ū         |
| 856       | 32          | TC LAST IMG MSEC | Time stamp of last good TC image               | milliseconds               | N/A                                                                                                                                                                                                                                | U         |
| 888       | 16          | TC LAST IMG USEC | Time stamp of last good TC image               | microseconds               | N/A                                                                                                                                                                                                                                | Ū         |
| 904       | 16          | M I CAL LED      | Current in the active Calibration LED          | milliamps                  | 0.005086.0                                                                                                                                                                                                                         | S         |
| 920       | 16          | M T MTR DRV BD   | Temperature - Motor Driver Board               | Celsius                    | -, -, -, 0.0484, -273,15                                                                                                                                                                                                           | S         |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 952       | 16          | TC_T_CCD         | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 968       | 16          | NP T CCD         | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 984       | 16          | M_V_MTR_RES_5V   | Voltage - Motor/Resolver Electronics +5V       | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1000      | 16          | M V RES 12V      | Voltage - Resolver Electronics +12V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1016      | 16          | M V RES M12V     | Voltage - Resolver Electronics -12V            | Volts                      | -, -, -, -, 0.00311,0                                                                                                                                                                                                              | S         |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -9.53E-11, 1.817E-6, -0.01566, 7.7     | s         |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1128      | 16          | IC_P_HTR_SET     | Power Setpoint - TC Window Heater              | vVatts                     | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                             | <u> </u>  |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                             | s         |
| 1160      | 16          | N_T_SIG_BD       | I emperature - Nadir Signal Board              | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                           | S         |
| 1176      | 16          | N_T_TIM_BD       | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | s         |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius                    | -32/68 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1208      | 16          | NP_T_WINDOW      | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1224      | 16          | TC_T_WINDOW_     | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1240      | 32          | N/A              | HW Start Tag (if image is not sampled)         | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 1272      | varies      | N/A              | CCD Data (# pixels x 32 bits/pixel)            | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| varies    | 32          | N/A              | HW End Tag (if image is not sampled)           | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| varies    | 8           | N/A              | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                | U         |
|           |             | Bh               |                                                |                            |                                                                                                                                                                                                                                    |           |

## 4.3.7.2.2 Nadir Profiler Calibration

The OMPS produces Nadir Profiler Calibration packets in APID 565. Solar, linearity and dark current calibrations are performed in a single orbit every week. Because the solar, linearity and dark current calibrations require different image sizes, the structure of APID 565 is illustrated as a variable-sized grouped packet in Figure 4.3-22, Figure 4.3-23, Figure 4.3-24 and Figure 4.3-25. It is possible but not expected for APID 565 to be a single standalone packet. The maximum size of a packet with a single image is included in the footnotes to Table 4.3.1. Since a maximum-sized packet will span multiple grouped packets, the first packet of a continuation grouped packet is shown in Figure 4.3-25. The user data fields are listed in Table 4.3.9 assuming there is a single grouped packet.



## Figure 4.3-22 OMPS First Grouped Nadir Profiler Calibration First Packet Format

|        |               |                   | PACKE           | T PRIMARY H | IEADER            |                   |           | User Data Field      |       |
|--------|---------------|-------------------|-----------------|-------------|-------------------|-------------------|-----------|----------------------|-------|
|        | Verson No.    | Packe             | t Identific     | cation      | Packet :          | Sequence          | Packet    | Science              |       |
|        |               | Type<br>Indicator | Sec Hdr<br>Flag | APID        | Sequence<br>Flags | Sequence<br>Count | Length    | CCD data<br>(middle) | TOTAL |
| Bits   | 3             | 1                 | 1               | 11          | 2                 | 14                | 16        | 8144                 | 8192  |
| Octets |               | 2                 | 2               |             |                   | 2                 | 2         | 1018                 | 1024  |
| Value  | 000           | 0 /               | 0               | 0x235       | 00                | varies            | 0x03F9    | varies               |       |
| Те     | lemetry Packe | t                 | - Byl           |             |                   | Middl             | le Packet |                      |       |

## Figure 4.3-23 OMPS Grouped Nadir Profiler Calibration Middle Packet Format

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

LAST PACKET

|        |               |                   | PACKI           | ET PRIMARY I | HEADER            |                   |        | User Data Field   |                                      |                               | 1      |
|--------|---------------|-------------------|-----------------|--------------|-------------------|-------------------|--------|-------------------|--------------------------------------|-------------------------------|--------|
|        | Verson No.    | Packe             | t Identifi      | cation       | Packet :          | Sequence          | Packet | Science           |                                      |                               | Ĩ      |
|        |               | Type<br>Indicator | Sec Hdr<br>Flag | APID         | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | HW End<br>Tag (if<br>not<br>sampled) | Pad Byte<br>(if<br>necessary) |        |
| Bits   | 3             | 1                 | 1               | 11           | 2                 | 14                | 16     | varies            | 32                                   | 8                             | varies |
| Octets |               |                   | 2               |              |                   | 2                 | 2      | varies            | 4                                    | 1                             | varies |
| Value  | 000           | 0 /               | 0               | 0x235        | 10                | varies            | varies | varies            | varies                               | fixed                         | 1      |
| Te     | lemetry Packe | t                 |                 |              |                   | Last              | Packet |                   |                                      |                               | •      |

## Figure 4.3-24 OMPS Grouped Nadir Profiler Calibration Last Packet Format

FIRST PACKET of a group, but not of the fir

|       | PACKET PRIMARY HEADER |                   |                 |        |                   |                   | SE     | CONDARY HEA | DER           | C.    | User Data Field |                  |           |                      |      |
|-------|-----------------------|-------------------|-----------------|--------|-------------------|-------------------|--------|-------------|---------------|-------|-----------------|------------------|-----------|----------------------|------|
|       | Verson No.            | Packe             | t Identific     | cation | Packet S          | Sequence          | Packet | Start of    | Packets       | Spare |                 | OMPS Header      |           | Science              |      |
|       |                       | Type<br>Indicator | Sec Hdr<br>Flag | APID   | Sequence<br>Flags | Sequence<br>Count | Length | Scan        | in RDR<br>- 1 |       | RDR<br>Version  | Cont Count<br>-1 | Cont Flag | CCD data<br>(middle) | τοτΑ |
| Bits  | 3                     | 1                 | 1               | 11     | 2                 | 14                | 16     | 64          | 8             | 8     | 16              | 8                | 8         | 8032                 | 8192 |
| ctets |                       |                   | 2               |        |                   | 2                 | 2      | 8           | 1             | 1     | 2               | 1                | 1         | 1004                 | 1024 |
| Value | 000                   | , 0               | 1               | 0x235  | 01                | varies            | 0x03F9 | varies      | varies        | 0x0   | varies          | varies           | varies    | varies               |      |
|       | Telemetry Packet      |                   |                 |        |                   |                   |        | 5.          |               |       |                 |                  |           |                      |      |

# Figure 4.3-25 OMPS Grouped Nadir Profiler Calibration First Packet Format

| Table 4.3.9 | <b>OMPS Nadir Profiler</b> | <b>Calibration Packet</b> | <b>User Data Fields</b> |
|-------------|----------------------------|---------------------------|-------------------------|
|-------------|----------------------------|---------------------------|-------------------------|

| Start Bit         | Bit<br>Size | Mnemonic Name                                     | Description                                                                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                              | Data Type   |
|-------------------|-------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------|
| 0                 | 16          | CCSDS_RDR_VER                                     | Version Number of RDR                                                                                                           | N/A                        | N/A                                                                                                                     | U           |
| 16                | 8           | CCSDS_CONT_COUNT                                  | Number of segmented CCSDS packet sequences - 1                                                                                  | N/A                        | N/A                                                                                                                     | U           |
| 24                | 8           | SENSOR ID                                         | OMPS Sensor Identification (not for Dwell or ESW/ Regtup statue)                                                                | N/A<br>N/A                 | N/A                                                                                                                     |             |
| 40                | 8           | ESW VERSION                                       | Elight Software Version Number (not for Dwell or ESW Bootup status) major version                                               | N/A                        | N/A                                                                                                                     | <u> </u>    |
| 48                | 8           | FSW VERSION                                       | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version                                               | N/A                        | N/A                                                                                                                     | Ŭ           |
| 56                | 2           | MEB_BOOT_IMG_ID                                   | Boot Image Identifier (not for Dwell or FSW Bootup status)                                                                      | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debua Monitor (TDM-which we should never boot from) | U           |
| 58                | 5           | MEB_SBC_ID                                        | Single Board Computer Identifier (not for Dwell or FSW Bootup status)                                                           | N/A                        | N/A                                                                                                                     | U           |
| 63                | 1           | MEB_SIDE                                          | Active MEB Side (not for Dwell or FSW Bootup status)                                                                            | 0                          | MEB2<br>MEB1                                                                                                            | U           |
| 64                | 8           | FSW_INIT_STATUS                                   | Flight Software Initialization Status (not for Dwell or FSW Bootup status)                                                      | 0-1                        | OK<br>ERROR                                                                                                             | U           |
| 72                | 8           | FSW_INIT_CODE                                     | Flight Software Initialization Code (not for Dwell or FSW Bootup status)                                                        | N/A                        | N/A                                                                                                                     | U           |
| 80                | 8           | FSW_PROTECTED                                     | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                             | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                                | U           |
| 88                | 4           | MEB_FLASH_PWR                                     | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                                               | 0 1                        | OFF<br>ON                                                                                                               | U           |
| 92                | 4           | EEPROM_SIDE                                       | EEPROM side used to boot                                                                                                        | 0                          | Boot Side 1                                                                                                             | U           |
| 96                | 7           | M MCR SPARE6                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 103               | 1           | M_MCR_L_SP_CTRL                                   | Limb Signal Processing Spare Control                                                                                            | 0                          | OFF                                                                                                                     | U           |
| 104               | 3           | M MCR SPARE5                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 107               | 1           | M_MCR_N_SP_CTRL                                   | Nadir Signal Processing Spare Control                                                                                           | 0                          | OFF                                                                                                                     | U           |
| 108               | 3           | M_MCR_SPARE4                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 111               | 1           | M_MCR_TEST_2                                      | Test connector                                                                                                                  | 0<br>1                     | OFF<br>ON                                                                                                               | U           |
| 112               | 7           | M_MCR_SPARE3                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 119               | 9           | M_CAL_LED_STATE                                   | State of the Calibration LEDs                                                                                                   | 0<br>1                     | OFF<br>ON                                                                                                               | U           |
| 128               | 7           | M_THCR_SPARE7                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 135               | 1           | M_THCR_DAC_BUSY                                   | State of the DACBUSY line                                                                                                       | 0                          | NOT_BUSY<br>BUSY                                                                                                        | U           |
| 136               | 3           | M_THCR_SPARE6                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 139               | 1           | M_TC_TEC_STATE                                    | State of the TC TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 140               | 3           | M_THCR_SPARE5                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 143               | 1           | M_NP_TEC_STATE                                    | State of the NP TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 144               | 3           | M THCR SPARE4                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 147               | 1           | M_LP_TEC_STATE                                    | State of the LP TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 148               | 3           | M THCR SPARE3                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 151               | 1           | M_TC_HTR_STATE                                    | State of the TC CCD Window Heater Control                                                                                       | 0                          | OFF                                                                                                                     | U           |
| 147<br>148<br>151 | 1           | M_LP_TEC_STATE<br>M_THCR_SPARE3<br>M_TC_HTR_STATE | State of the LP TEC Control Unused bits of the TEC & Heater Control & Status Register State of the TC CCD Window Heater Control | 0<br>1<br>N/A<br>0<br>1    | OFF<br>ON<br>N/A<br>OFF<br>ON                                                                                           | U<br>U<br>U |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED<br>PWR DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              | U         |
|           |             | <b>DB</b>        |                                                           |                            |                                                                            |           |

| Table 4.3.9 OMPS Nadir Profiler | Calibration Packet User Data Fields (cont) |
|---------------------------------|--------------------------------------------|
|---------------------------------|--------------------------------------------|

| Bit<br>Size | Mnemonic Name                                                                                                                                                                                                   | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Units<br>OR<br>State Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Data Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 3           | M_MCSR_SPARE2                                                                                                                                                                                                   | Unused register bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | OPEN<br>CLOSED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1           | M_RES_ENABLE                                                                                                                                                                                                    | Resolver Circuitry Enable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | DISABLED<br>ENABLED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 3           | M_MCSR_SPARE1                                                                                                                                                                                                   | Unused register bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 0<br>1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OPEN<br>CLOSED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1           | M_MTR_RES_PWR                                                                                                                                                                                                   | Motor and Resolver Power State                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0<br>1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | OFF<br>ON                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1           | M_N_RESOLV_BUSY                                                                                                                                                                                                 | Nadir Resolver Data Register - Busy                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | NOT_BUSY<br>BUSY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 15          | M_N_RESOLV_SPARE                                                                                                                                                                                                | Nadir Resolver Data Register - Unused Bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_N_RESOLV_DATA                                                                                                                                                                                                 | Nadir Resolver Data Register - Resolver Data                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 7           | M_NMP_SPARE4                                                                                                                                                                                                    | Nadir Motor Parameter Register - Unused Bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CW<br>CCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 1           | M_N_DIRECTION                                                                                                                                                                                                   | Nadir Motor Direction                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CW<br>CCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2           | M_NMP_SPARE3                                                                                                                                                                                                    | Nadir Motor Parameter Register - Unused Bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | CW<br>CCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2           | M_N_SPEED                                                                                                                                                                                                       | Nadir Motor Speed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0<br>1<br>2<br>3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2           | M_NMP_SPARE2                                                                                                                                                                                                    | Nadir Motor Parameter Register - Unused Bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0<br>1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CW<br>CCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2           | M_N_PHASE                                                                                                                                                                                                       | Nadir Motor Phase                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0<br>1<br>2<br>3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 4           | M_NMP_SPARE1                                                                                                                                                                                                    | Nadir Motor Parameter Register - Unused Bits                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 0<br>1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | CW<br>CCW                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 12          | M_N_STEP_COUNT                                                                                                                                                                                                  | Nadir Motor Step Count                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 8           | M_N_RETRIES                                                                                                                                                                                                     | Nadir Motor Retries                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_N_DESTINATION                                                                                                                                                                                                 | Nadir Diffuser Move Destination                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_TC_TEC_SETPT                                                                                                                                                                                                  | Commanded TC TEC Setpoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_TC_HTR_SETPT                                                                                                                                                                                                  | Commanded TC CCD Window Heater Setpoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_NP_TEC_SETPT                                                                                                                                                                                                  | Commanded NP TEC Setpoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_NP_HIR_SEIPI                                                                                                                                                                                                  | Commanded NP CCD Window Heater Setpoint                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 16          | M_N_POSITION                                                                                                                                                                                                    | Nadir Diffuser Motor Position                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 0           |                                                                                                                                                                                                                 | Nadir Active Timing Pattern Table Version Number - major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A<br>N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 0           |                                                                                                                                                                                                                 | Nadir Active Timing Pattern Table Version Number major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 16          |                                                                                                                                                                                                                 | Nadii Active Hining Fatterin Table Version Number = Hinior Version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | NVA<br>NVA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | - <u> </u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 22          |                                                                                                                                                                                                                 | Nadii TEG Integration Hold Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | millicocondo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <u>u</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|             |                                                                                                                                                                                                                 | I CHOILOR                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|             | Size       3       1       3       1       15       16       7       2       2       2       2       2       2       2       2       16       16       16       16       16       16       16       16       32 | Size     Mnemonic Name       3     M_MCSR_SPARE2       1     M_RES_ENABLE       3     M_MCSR_SPARE1       1     M_MTR_RES_PWR       1     M_NRESOLV_BUSY       15     M_N RESOLV_SPARE       16     M_N RESOLV_DATA       7     M_NMP_SPARE4       1     M_N_SPARE4       1     M_N_SPARE4       1     M_NMP_SPARE3       2     M_NMP_SPARE3       2     M_N_SPEED       2     M_NP_SPARE1       12     M_NSTEP COUNT       8     M_N RETRIES       16     M N STEP COUNT       8     M N PETRIES       16     M NP SETPT       16     M NP TR SETPT       16     M N PATT VER       18     M N NPOS ID       8     N TIM PAT VER       16     N IM PAT VER | Size         Meemonic Name         Description           3         M_MCSR_SPARE2         Unused register bits           1         M_RES_ENABLE         Resolver Circuitry Enable           3         M_MCSR_SPARE1         Unused register bits           1         M_MTR_RES_PWR         Motor and Resolver Data Register - Busy           1         M_MTR_RES_PWR         Nadir Resolver Data Register - Unused Bits           1         M_MR_SPARE4         Nadir Resolver Data Register - Unused Bits           16         M_M_RESOLV_DATA         Nadir Motor Parameter Register - Unused Bits           1         M_NDP_SPARE4         Nadir Motor Direction           2         M_MNP_SPARE3         Nadir Motor Parameter Register - Unused Bits           2         M_NNP_SPARE2         Nadir Motor Parameter Register - Unused Bits           2         M_NNP_SPARE2         Nadir Motor Parameter Register - Unused Bits           2         M_NNP_SPARE1         Nadir Motor Parameter Register - Unused Bits           12         M_N NETIRES         Nadir Motor Step Count           8         M_N NETIRES         Nadir Motor Step Count           8         M_N NETIRES         Nadir Motor Parameter Register - Unused Bits           12         M_STEP COUNT         Nadir Motor Step Count           8 | Bose         Mission         CR<br>State Value           3         M_MCSR_SPARE2         Unused register bits         1           1         M_RES_ENABLE         Resolver Circuitry Enable         1           3         M_MCSR_SPARE1         Unused register bits         1           1         M_MCSR_SPARE1         Unused register bits         1           1         M_MTR_RES_PWR         Motor and Resolver Power State         1           1         M_MTR_RES_VUX_BUSY         Natif Resolver Data Register - Baxy         1           16         M_M_NESOLV_SDATA         Natif Resolver Data Register - Baxy         1           1         M_N_NESOLV_SPARE         Natif Motor Parameter Register - Unused Bits         1           1         M_N_NESPARE3         Natif Motor Parameter Register - Unused Bits         1           2         M_NMP_SPARE3         Natif Motor Parameter Register - Unused Bits         1           2         M_N_NP_SPARE3         Natif Motor Parameter Register - Unused Bits         1           2         M_N_NP_SPARE1         Natif Motor Parameter Register - Unused Bits         1           4         M_NMP_SPARE1         Natif Motor Parameter Register - Unused Bits         1           6         M_N N EETRIES         Natif Motor Motor Barameter Register - U | Sole         Memory Name         Description         OR<br>Both Values         OR<br>Both Values         OR<br>Both Values           3         M.M.CSE, BFARE2         Linsed-register bis         0         0         DBM Values           3         M.MCSE, BFARE2         Linsed-register bis         0         0         DBM Values           3         M.MCSE, BFARE2         Linsed-register bis         0         0         DBM Values           1         M.MCSE, BFARE2         Linsed-register bis         0         0         CLOSED           1         M.MCSE, BFARE2         Mater and Readower Power Data         0         CLOSED         CHO           1         M.M.M.RESCOV.WARK         Mater and Readower Power Data         0         CHO         CHO           1         M.M.M.RESCOV.WARK         Mater and Readower Data Register - Unuade Bis         Not         Not           2         M.M.N.PS, SPARE3         Neadr Motor Parameter Register - Unuade Bis         0         COV         COV           2         M.M.N.PS, SPARE3         Neadr Motor Parameter Register - Unuade Bis         0         COV         COV           2         M.M.N.PS, SPARE3         Neadr Motor Parameter Register - Unuade Bis         0         COV         COV         COV         COV |

| Table 4.3.9 OMPS Nadir Prot | ler Calibration Packet | User Data Fields (cont) |
|-----------------------------|------------------------|-------------------------|
|-----------------------------|------------------------|-------------------------|

|           |      |                  |                                                          | Units       | Conversion Coefficients (formula or C5.C4.C3.C2.C1.C0) |           |
|-----------|------|------------------|----------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit  | Mnemonic Name    | Description                                              | OR          | OR                                                     | Data Type |
|           | Size |                  |                                                          | State Value | State Name                                             |           |
| 448       | 8    |                  | Active Nadir Profile ID                                  | N/A         | Ν/Α                                                    |           |
| 440       | 8    |                  | Nadir Imaging Profile Table Version Number major version | N/A         | N/A                                                    | <u> </u>  |
| 464       | 8    |                  | Nadir Imaging Profile Table Version Number major version | N/A         | N/A                                                    | - ŭ       |
| 472       | 16   | N TIM PAT TBI    | Nadir Timing Pattern Table ID                            | N/A         | N/A                                                    | - ŭ       |
| 488       | 16   |                  | Nadir Total Column Application ID                        | N/A         | N/A                                                    | - ŭ       |
| 504       | 16   | NP APID          | Nadir Profiler Application ID                            | N/A         | N/A                                                    | - ŭ       |
|           |      |                  |                                                          | 0           | DISABLED                                               |           |
| 520       | 8    | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 1           | ENABLED                                                | U         |
| 528       | 16   | TC_LIN_CORR_TBL  | Nadir Total Column Linearity Correction Table ID         | N/A         | N/A                                                    | U         |
| 544       | 16   | TC_FIXED_COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A         | N/A                                                    | U         |
| 560       | 8    | TC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 0<br>1      | DISABLED<br>ENABLED                                    | U         |
| 568       | 8    | TC GAIN COPP     | Nadir Total Column Gain Correction Flag                  | 0           | DISABLED                                               |           |
| 500       | 0    | TC_GAIN_CONN     |                                                          | 1           | ENABLED                                                | 0         |
| 576       | 16   | TC_GAIN_CORR_TBL | Nadir Total Column Gain Correction Table ID              | N/A         | N/A                                                    | U         |
| 592       | 8    | TC BIN IMG       | Nadir Total Column Bin Image Flag                        | 0           | DISABLED                                               | U         |
|           | -    | TO 04440 TO      |                                                          | 1           | ENABLED                                                |           |
| 600       | 16   | TC_SAMP_TBL      | Nadir Total Column Sample Table ID                       | N/A         | N/A                                                    | U         |
| 616       | 8    | NP_LIN_CORR      | Nadir Profiler Linearity Correction Flag                 |             | DISABLED                                               | U         |
| 624       | 16   |                  | Nadir Brafilar Linearity Correction Table ID             | N/A         |                                                        |           |
| 640       | 10   |                  | Nadir Profiler Eineanty Correction Table ID              | N/A         | N/A                                                    |           |
| 040       | 10   | NF_FIXED_COADD3  |                                                          | 0           |                                                        | 0         |
| 656       | 8    | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 1           | ENABLED                                                | U         |
|           |      |                  |                                                          | i i         | DISABLED                                               |           |
| 664       | 8    | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 1           | ENABLED                                                | U         |
| 672       | 16   | NP GAIN CORR TBL | Nadir Profilier Gain Correction Table ID                 | N/A         | N/A                                                    | U         |
| 000       |      |                  |                                                          | 0           | DISABLED                                               |           |
| 688       | 8    | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 1           | ENABLED                                                | U         |
| 696       | 16   | NP_SAMP_TBL      | Nadir Profilier Sample Table ID                          | N/A         | N/A                                                    | U         |
| 712       | 8    | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version major version      | N/A         | N/A                                                    | U         |
| 720       | 8    | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version major version      | N/A         | N/A                                                    | U         |
| 728       | 8    | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A         | N/A                                                    | U         |
| 736       | 8    | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A         | N/A                                                    | U         |
| 744       | 8    | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A         | N/A                                                    | U         |
| 752       | 8    | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A         | N/A                                                    | U         |
| 760       | 8    | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A         | N/A                                                    | U         |
| 768       | 8    | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A         | N/A                                                    | U         |
| 776       | 8    | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A         | N/A                                                    | U         |
| 784       | 8    | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A         | N/A                                                    | 0         |
| /92       | 8    | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A         | N/A                                                    | U         |
| 800       | 8    | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A         | N/A                                                    | U         |
|           |      | UR.              |                                                          |             |                                                        |           |

| Table 4.3.9 | <b>OMPS Nadir Profiler</b> | <b>Calibration Pack</b> | ket User Data | Fields (cont) |
|-------------|----------------------------|-------------------------|---------------|---------------|
|-------------|----------------------------|-------------------------|---------------|---------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                           | Data Type |
|-----------|-------------|------------------|------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 808       | 16          | NP ROWS          | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                  | - U       |
| 824       | 16          | NP COLS          | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                  | <u> </u>  |
| 840       | 16          | NP LAST IMG DOY  | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                  | - ŭ       |
| 856       | 32          | NP LAST ING MSEC | Time stamp of last good TO image (dd) of year) | milliseconds               | N/A                                                                                                                                                                                                                                  | - ŭ       |
| 888       | 16          |                  | Time stamp of last good TC image               | microseconde               | Ν/Δ                                                                                                                                                                                                                                  | - ŭ       |
| 904       | 16          |                  | Current in the active Collibration LED         | milliampe                  | 0.005086.0                                                                                                                                                                                                                           |           |
| 920       | 16          |                  |                                                | Colsius                    | -, -, -, -, 0.0484273.15                                                                                                                                                                                                             |           |
| 920       | 10          | M_T_MIR_DRV_BD   |                                                | Celsius                    | -, -, -, -, 0.0404, -273.13                                                                                                                                                                                                          | 3         |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius                    | - 32769 10 53, -, -1.465E-5, 0.02033, -1.99, 128.6<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7     | S         |
| 952       | 16          | TC_T_CCD         | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -,-0.00737, 3.76                                                                                                                                                                                                            | S         |
| 968       | 16          | NP_T_CCD         | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -0.00737, 3.76                                                                                                                                                                                                              | S         |
| 984       | 16          | M V MTR RES 5V   | Voltage - Motor/Resolver Electronics +5V       | Volts                      | -, -, -, 0.00311, 0                                                                                                                                                                                                                  | S         |
| 1000      | 16          | M V RES 12V      | Voltage - Resolver Electronics +12V            | Volts                      | -, -, -, 0.00311, 0                                                                                                                                                                                                                  | S         |
| 1016      | 16          | M V RES M12V     | Voltage - Resolver Electronics -12V            | Volts                      | -, -, -, 0.00311, 0                                                                                                                                                                                                                  | S         |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, 9.53E-11, 1.817E-6, -0.01566, 7      | s         |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7   | S         |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128,8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, 1.044E-8, 4.681E-5, -0.08272, 43,02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7    | S         |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7   | S         |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, 9.53E-11, 1.817E-6, -0.01566, 7.7    | s         |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -, 1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1128      | 16          | TC_P_HTR_SET     | Power Setpoint - TC Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                               |           |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                  | S         |
| 1160      | 16          | N_T_SIG BD       | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                             | S         |
| 1176      | 16          | N T TIM BD       | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                             | S         |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, 1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7    | S         |
| 1208      | 16          | NP_T_WINDOW      | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                             | S         |
| 1224      | 16          | TC_T_WINDOW      | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                             | S         |
| 1240      | 32          |                  | HW Start Tag (if image is not sampled)         | N/A                        | N/A                                                                                                                                                                                                                                  | U         |
| 1272      | varies      | N/A              | CCD Data (# pixels x 32 bits/bixel)            | N/A                        | N/A                                                                                                                                                                                                                                  | Ū         |
| varies    | 32          | N/A              | HW End Tag (if image is not sampled)           | N/A                        | N/A                                                                                                                                                                                                                                  | Ū         |
| varies    | 8           | N/A              | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                  | ŭ         |
|           |             | DB.              |                                                |                            |                                                                                                                                                                                                                                      | ·         |

## 4.3.7.2.3 Limb Profiler Calibration

The OMPS produces Limb Profiler Calibration packets in APID 566. Solar, linearity and dark current calibrations are performed in a single orbit every week. Because the solar, linearity and dark current calibrations require different image sizes, the structure of APID 566 is illustrated as variable in size in Figure 4.3-26, Figure 4.3-27, Figure 4.3-28 and Figure 4.3-29. The maximum size of a packet with a single image is included in the footnotes to Table 4.3.1. Since a maximum-sized packet will span multiple grouped packets, the first packet of a continuation grouped packet is shown in Figure 4.3-29. The user data fields are listed in Table 4.3.10 assuming there is a single grouped packet.

| FIRST PACK | ET, first | group             |                 |            |                            |                     |                 |                   |                   |                 |                                  |                      |                     |                      |                       |                      |                                     |                     |     |
|------------|-----------|-------------------|-----------------|------------|----------------------------|---------------------|-----------------|-------------------|-------------------|-----------------|----------------------------------|----------------------|---------------------|----------------------|-----------------------|----------------------|-------------------------------------|---------------------|-----|
|            |           |                   | PACKE           | T PRIMARY  | HEADER                     |                     |                 | SEC               | CONDARY HEA       | DER             |                                  |                      |                     | User D               | ata Field             |                      |                                     |                     | 1   |
|            | Verson    | Packe             | : Identific     | cation     | Packet                     | Sequence            | Packet          | Start of          | Packets           | Spare           |                                  | OMPS Head            | er                  | E                    | ngineering            | Data                 | Scier                               | nce                 | 1   |
|            | No.       | Type<br>Indicator | Sec Hdr<br>Flag | APID       | Sequence<br>Flags          | Sequence<br>Count   | Length          | Scan              | in RDR<br>- 1     |                 | RDR<br>Version                   | Cont<br>Count<br>-1  | Cont Flag           | Engin                | eering Data           | Sections             | HW Start<br>Tag (if not<br>sampled) | CCD data<br>(start) |     |
| Bits       | 3         | 1                 | 1               | 11         | 2                          | 14                  | 16              | 64                | 8                 | 8               | 16                               | 8                    | 8                   |                      | 1096                  |                      | 32                                  | varies              | 819 |
| Octets     |           |                   | 2               |            |                            | 2                   | 2               | 8                 | 1                 | 1               | 2                                | 1                    | 1                   |                      | 137                   |                      | 4                                   | varies              | 102 |
| Value      | 000       | 1 0               | 1 、             | 0x236      | 01                         | varies              | 0x03F9          | varies            | varies            | 0x00            | varies                           | varies               | varies              |                      | varies                |                      | varies                              | varies              |     |
|            |           |                   |                 | $\geq -$ [ | Secondary<br>Header Presen | ıt                  |                 |                   |                   |                 |                                  |                      |                     |                      |                       |                      |                                     |                     | -   |
|            |           |                   | etny Packet     |            |                            |                     |                 |                   |                   | 7.0.            |                                  | Engineeri            | ng Data             |                      |                       |                      |                                     |                     | 1   |
|            |           |                   |                 |            |                            | Sensor_In<br>fo (7) | Mech_SD<br>(59) | Mech_Limb<br>(63) | Mech_Limb<br>(72) | Limb_SD<br>(65) | Limb_IMG_<br>Profile_S<br>D (51) | Limb_1st_<br>SD (49) | Limb_2nd_SD<br>(67) | Curr_LED_<br>SD (26) | Temp_Mech<br>_SD (30) | Temp_Limb_SD<br>(29) | Volt_Mech_S<br>D (42)               | Temp_Limb<br>(25)   |     |
|            |           |                   |                 |            |                            | 64                  | 112             | 88                | 56                | 96              | 264                              | 64                   | 64                  | 16                   | 16                    | 64                   | 48                                  | 144                 | 1   |
|            |           |                   |                 |            |                            | 8                   | 14              | 11                | 7                 | 12              | 33                               | 8                    | 8                   | 2                    | 2                     | 8                    | 6                                   | 18                  | 1   |
|            |           |                   |                 |            |                            | varies              | varies          | varies            | varies            | varies          | varies                           | varies               | varies              | varies               | varies                | varies               | varies                              | varies              | 1   |

## Figure 4.3-26 OMPS First Grouped Limb Calibration First Packet Format

MIDDLE PACKET



## **3**.....

LAST PACKET

|        |              |           | PACKE      | T PRIMARY | HEADER   |          |        | User Data Field |            |           | ]      |
|--------|--------------|-----------|------------|-----------|----------|----------|--------|-----------------|------------|-----------|--------|
|        | Verson       | Packe     | t Identifi | cation    | Packet S | Sequence | Packet | Science         |            |           |        |
|        | No.          | Туре      | Sec Hdr    | APID      | Sequence | Sequence | Length | CCD data        | HW End Tag | Pad Byte  |        |
|        |              | Indicator | Flag       |           | Flags    | Count    |        | (end)           | (if not    | (if       |        |
|        |              |           |            |           |          |          |        |                 | sampled)   | necessary | TOTAL  |
| Bits   | 3            | 1         | 1          | 11        | 2        | 14       | 16     | varies          | 32         | 8         | varies |
| Octets |              |           | 2          |           |          | 2        | 2      | varies          | 4          | 1         | varies |
| Value  | 000          | 0 /       | 0          | 0x236     | 10       | varies   | varies | varies          | varies     | fixed     |        |
| Те     | lemetry Pack | et        |            |           |          | Last     | Packet |                 |            |           | -      |

# Figure 4.3-28 OMPS Grouped Limb Calibration Last Packet Format

FIRST PACKET of a group, but not of the first group

| [      |        |                   | PACKE           | T PRIMARY | HEADER              |                   |        | SEC      | CONDARY HEA   | DER   |                |                     |           | User Data Field      |       |
|--------|--------|-------------------|-----------------|-----------|---------------------|-------------------|--------|----------|---------------|-------|----------------|---------------------|-----------|----------------------|-------|
|        | Verson | Packe             | t Identific     | cation    | Packet              | Sequence          | Packet | Start of | Packets       | Spare |                | OMPS Head           | er        | Science              |       |
|        | No.    | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags   | Sequence<br>Count | Length | Scan     | in RDR<br>- 1 |       | RDR<br>Version | Cont<br>Count<br>-1 | Cont Flag | CCD data<br>(middle) | TOTAL |
| Bits   | 3      | 1                 | 1               | 11        | 2                   | 14                | 16     | 64       | 8             | 8     | 16             | 8                   | 8         | 8032                 | 8192  |
| Octets |        |                   | 2               |           |                     | 2                 | 2      | 8        | 1             | 1     | 2              | 1                   | 1         | 1004                 | 1024  |
| Value  | 000    | , 0               | 1               | 0x236     | 01                  | varies            | 0x03F9 | varies   | varies        | 0×0   | varies         | varies              | varies    | varies               |       |
| -      |        | Telen             | netry Packet    |           | Secondary<br>Header | ]                 |        |          |               | 1.    |                |                     |           |                      |       |

# Figure 4.3-29 OMPS Grouped Limb Calibration First Packet Format

| Table 4.3.10 | OMPS Limb | Calibration | Packet | <b>User Data</b> | Fields |
|--------------|-----------|-------------|--------|------------------|--------|
|--------------|-----------|-------------|--------|------------------|--------|

| $\begin{array}{c c c c c c c c c c c c c c c c c c c $                                                                                                                                                                                                        | CCSDS_RDR_VER<br>CCSDS_CONT_COUNT<br>CCSDS_CONT_FLAG<br>SENSOR ID<br>FSW_VERSION<br>FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SBC_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR | Version Number of RDR Number of segmented CCSDS packet sequences - 1 Indicates if this CCSDS packet begins an RDR OMPS Sensor Identification (not for Dwell or FSW Bootup status) Flight Software Version Number (not for Dwell or FSW Bootup status) major version Flight Software Version Number (not for Dwell or FSW Bootup status) minor version Boot Image Identifier (not for Dwell or FSW Bootup status) Single Board Computer Identifier (not for Dwell or FSW Bootup status) Active MEB Side (not for Dwell or FSW Bootup status) Flight Software Initialization Status (not for Dwell or FSW Bootup status) Flight Software Initialization Code (not for Dwell or FSW Bootup status) OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                  | N/A           N/A           N/A           N/A           N/A           0           1           2           3           N/A           0           1           0           1           0           1           0           1           0                                   | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK |             |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                        | CSDS_CONT_COUNT<br>CCSDS_CONT_FLAG<br>SENSOR_ID<br>FSW_VERSION<br>FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SDC_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                 | Number of segmented CCSDS packet sequences - 1           Indicates if this CCSDS packet begins an RDR           OMPS Sensor Identification (not for Dwell or FSW Bootup status)           Flight Software Version Number (not for Dwell or FSW Bootup status) major version           Flight Software Version Number (not for Dwell or FSW Bootup status) minor version           Boot Image Identifier (not for Dwell or FSW Bootup status)           Single Board Computer Identifier (not for Dwell or FSW Bootup status)           Active MEB Side (not for Dwell or FSW Bootup status)           Flight Software Initialization Status (not for Dwell or FSW Bootup status)           Flight Software Initialization Code (not for Dwell or FSW Bootup status)           Flight Software Initialization Code (not for Dwell or FSW Bootup status)           OMPS Protected State Indicator (not for Dwell or FSW Bootup status) | N/A           N/A           N/A           N/A           0           1           2           3           N/A           0           1           0           1           0           1           0           1           0           1           0           1           0 | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK        |             |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $                                                                                                                                                                                                        | CCSDS_CONT_FLAG<br>SENSOR_ID<br>FSW_VERSION<br>FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SBC_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                       | Indicates if this CCSDS packet begins an RDR OMPS Sensor Identification (not for Dwell or FSW Bootup status) Flight Software Version Number (not for Dwell or FSW Bootup status) – major version Flight Software Version Number (not for Dwell or FSW Bootup status) – minor version Boot Image Identifier (not for Dwell or FSW Bootup status) Single Board Computer Identifier (not for Dwell or FSW Bootup status) Active MEB Side (not for Dwell or FSW Bootup status) Flight Software Initialization Status (not for Dwell or FSW Bootup status) Flight Software Initialization Code (not for Dwell or FSW Bootup status) OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                   | N/A<br>N/A<br>N/A<br>0<br>1<br>2<br>3<br>N/A<br>0<br>1<br>0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                      | N/A<br>N/A<br>N/A<br>N/A<br>As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK               |             |
| 32     8       40     8       48     8       56     2       58     5       63     1       64     8       72     8       80     8       88     4       92     4       96     7                                                                                 | SENSOR ID<br>FSW_VERSION<br>FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                       | OMPS Sensor Identification (not for Dwell or FSW Bootup status) Flight Software Version Number (not for Dwell or FSW Bootup status) major version Flight Software Version Number (not for Dwell or FSW Bootup status) minor version Boot Image Identifier (not for Dwell or FSW Bootup status) Single Board Computer Identifier (not for Dwell or FSW Bootup status) Active MEB Side (not for Dwell or FSW Bootup status) Flight Software Initialization Status (not for Dwell or FSW Bootup status) Flight Software Initialization Code (not for Dwell or FSW Bootup status) OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                    | N/A<br>N/A<br>0<br>1<br>2<br>3<br>N/A<br>0<br>1<br>0<br>-1<br>-1<br>N/A                                                                                                                                                                                                 | N/A<br>N/A<br>N/A<br>As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK                      |             |
| 40     8       48     8       56     2       58     5       63     1       64     8       72     8       80     8       92     4       96     7                                                                                                               | FSW_VERSION<br>FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                     | Flight Software Version Number (not for Dwell or FSW Bootup status) major version         Flight Software Version Number (not for Dwell or FSW Bootup status) minor version         Boot Image Identifier (not for Dwell or FSW Bootup status)         Single Board Computer Identifier (not for Dwell or FSW Bootup status)         Active MEB Side (not for Dwell or FSW Bootup status)         Flight Software Initialization Status (not for Dwell or FSW Bootup status)         Flight Software Initialization Code (not for Dwell or FSW Bootup status)         Flight Software Initialization Code (not for Dwell or FSW Bootup status)         OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                           | N/A<br>N/A<br>0<br>1<br>2<br>3<br>N/A<br>0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                                       | N/A<br>N/A<br>As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK                             |             |
| 48     8       56     2       58     5       63     1       64     8       72     8       80     8       88     4       92     4       96     7                                                                                                               | FSW_VERSION<br>MEB_BOOT_IMG_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                    | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version         Boot Image Identifier (not for Dwell or FSW Bootup status)         Single Board Computer Identifier (not for Dwell or FSW Bootup status)         Active MEB Side (not for Dwell or FSW Bootup status)         Flight Software Initialization Status (not for Dwell or FSW Bootup status)         Flight Software Initialization Code (not for Dwell or FSW Bootup status)         OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                      | N/A<br>0<br>1<br>2<br>3<br>N/A<br>0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                                              | N/A As launched boot image Flight Modifiable Not used Motorola Debug Monitor (TDMwhich we should never boot from) N/A MEB2 MEB1 OK                                                            |             |
| 56         2         1           58         5         -           63         1         -           64         8         -           72         8         -           80         8         -           92         4         -           96         7         - | MEB_BOOT_IMG_ID<br>MEB_SBC_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                     | Boot Image Identifier (not for Dwell or FSW Bootup status) Single Board Computer Identifier (not for Dwell or FSW Bootup status) Active MEB Side (not for Dwell or FSW Bootup status) Flight Software Initialization Status (not for Dwell or FSW Bootup status) Flight Software Initialization Code (not for Dwell or FSW Bootup status) OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0<br>1<br>2<br>3<br>N/A<br>0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                                                     | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from)<br>N/A<br>MEB2<br>MEB1<br>OK                                           | U<br>U<br>U |
| 58         5           63         1           64         8           72         8           80         8           88         4           92         4           96         7                                                                                 | MEB_SBC_ID<br>MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                                        | Single Board Computer Identifier (not for Dwell or FSW Bootup status)<br>Active MEB Side (not for Dwell or FSW Bootup status)<br>Flight Software Initialization Status (not for Dwell or FSW Bootup status)<br>Flight Software Initialization Code (not for Dwell or FSW Bootup status)<br>OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | N/A<br>0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                                                                         | N/A<br>MEB2<br>MEB1<br>OK                                                                                                                                                                     | U<br>U      |
| 63         1           64         8           72         8           80         8           88         4           92         4           96         7                                                                                                        | MEB_SIDE<br>FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                                                      | Active MEB Side (not for Dwell or FSW Bootup status)<br>Flight Software Initialization Status (not for Dwell or FSW Bootup status)<br>Flight Software Initialization Code (not for Dwell or FSW Bootup status)<br>OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0<br>1<br>0<br>-1<br>N/A                                                                                                                                                                                                                                                | MEB2<br>MEB1<br>OK                                                                                                                                                                            | U           |
| 64         8           72         8           80         8           88         4           92         4           96         7                                                                                                                               | FSW_INIT_STATUS<br>FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                                                                  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)<br>Flight Software Initialization Code (not for Dwell or FSW Bootup status)<br>OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0<br>-1<br>N/A                                                                                                                                                                                                                                                          | ОК                                                                                                                                                                                            |             |
| 72         8           80         8           88         4           92         4           96         7                                                                                                                                                      | FSW_INIT_CODE<br>FSW_PROTECTED<br>MEB_FLASH_PWR                                                                                                                                                                                     | Flight Software Initialization Code (not for Dwell or FSW Bootup status)<br>OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                                                                                                                                                                                                                     | ERROR                                                                                                                                                                                         | U           |
| 80         8           88         4           92         4           96         7                                                                                                                                                                             | FSW_PROTECTED                                                                                                                                                                                                                       | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                           | U           |
| 88         4           92         4           96         7                                                                                                                                                                                                    | MEB FLASH PWR                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1 0                                                                                                                                                                                                                                                                     | PROTECTED<br>UNPROTECTED                                                                                                                                                                      | U           |
| 92 4<br>96 7                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                     | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0                                                                                                                                                                                                                                                                       | OFF<br>ON                                                                                                                                                                                     | U           |
| 96 7                                                                                                                                                                                                                                                          | EEPROM_SIDE                                                                                                                                                                                                                         | EEPROM side used to boot                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0<br>1                                                                                                                                                                                                                                                                  | Boot Side 1<br>Boot Side 2                                                                                                                                                                    | U           |
|                                                                                                                                                                                                                                                               | M_MCR_SPARE6                                                                                                                                                                                                                        | Unused bits of the Miscellaneous Control Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 103 1 M                                                                                                                                                                                                                                                       | M_MCR_L_SP_CTRL                                                                                                                                                                                                                     | Limb Signal Processing Spare Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | U           |
| 104 3                                                                                                                                                                                                                                                         | M MCR SPARE5                                                                                                                                                                                                                        | Unused bits of the Miscellaneous Control Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 107 1 N                                                                                                                                                                                                                                                       | M_MCR_N_SP_CTRL                                                                                                                                                                                                                     | Nadir Signal Processing Spare Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | U           |
| 108 3                                                                                                                                                                                                                                                         | M MCR SPARE4                                                                                                                                                                                                                        | Unused bits of the Miscellaneous Control Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 111 1                                                                                                                                                                                                                                                         | M_MCR_TEST_2                                                                                                                                                                                                                        | Test connector                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0                                                                                                                                                                                                                                                                       | OFF<br>ON                                                                                                                                                                                     | U           |
| 112 7                                                                                                                                                                                                                                                         | M_MCR_SPARE3                                                                                                                                                                                                                        | Unused bits of the Miscellaneous Control Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 119 9 H                                                                                                                                                                                                                                                       | M_CAL_LED_STATE                                                                                                                                                                                                                     | State of the Calibration LEDs                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0<br>1                                                                                                                                                                                                                                                                  | OFF<br>ON                                                                                                                                                                                     | U           |
| 128 7                                                                                                                                                                                                                                                         | M_THCR_SPARE7                                                                                                                                                                                                                       | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 135 1 M                                                                                                                                                                                                                                                       | M_THCR_DAC_BUSY                                                                                                                                                                                                                     | State of the DACBUSY line                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0<br>1                                                                                                                                                                                                                                                                  | NOT_BUSY<br>BUSY                                                                                                                                                                              | U           |
| 136 3                                                                                                                                                                                                                                                         | M_THCR_SPARE6                                                                                                                                                                                                                       | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 139 1                                                                                                                                                                                                                                                         | M TO TEO STATE                                                                                                                                                                                                                      | State of the TC TEC Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | ш           |
| 100 1                                                                                                                                                                                                                                                         | M_10_120_01X12                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1                                                                                                                                                                                                                                                                       | ON                                                                                                                                                                                            | 0           |
| 140 3                                                                                                                                                                                                                                                         | M_THCR_SPARE5                                                                                                                                                                                                                       | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 143 1                                                                                                                                                                                                                                                         | M_NP_TEC_STATE                                                                                                                                                                                                                      | State of the NP TEC Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | U           |
| 144 3                                                                                                                                                                                                                                                         | M_THCR_SPARE4                                                                                                                                                                                                                       | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 147 1                                                                                                                                                                                                                                                         | M_LP_TEC_STATE                                                                                                                                                                                                                      | State of the LP TEC Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | U           |
| 148 3                                                                                                                                                                                                                                                         | M THCR SPARE3                                                                                                                                                                                                                       | Unused bits of the TEC & Heater Control & Status Register                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                           | U           |
| 151 1                                                                                                                                                                                                                                                         | M_TC_HTR_STATE                                                                                                                                                                                                                      | State of the TC CCD Window Heater Control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0                                                                                                                                                                                                                                                                       | OFF                                                                                                                                                                                           | U           |

| Table 4.3.10 | <b>OMPS</b> Limb | Calibration | Packet | <b>User Data</b> | Fields (cont) |
|--------------|------------------|-------------|--------|------------------|---------------|
|--------------|------------------|-------------|--------|------------------|---------------|

|           |             |                  |                                                           |                            | A                                                                          |           |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
|           |             | - Br             | 7                                                         |                            |                                                                            |           |

| Table 4.3.10 | OMPS Limb | Calibration | Packet | User | Data Fiel | lds (cont) |
|--------------|-----------|-------------|--------|------|-----------|------------|
|--------------|-----------|-------------|--------|------|-----------|------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                          | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_L_RESOLV_BUSY  | Limb Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M_L_RESOLV_SPARE | Limb Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_L_RESOLV_DATA  | Limb Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |
| 240       | 7           | M_LMP_SPARE4     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_L_DIRECTION    | Limb Motor Direction                                          |                            | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_LMP_SPARE3     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_L_SPEED        | Limb Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_LMP_SPARE2     | Limb Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_L_PHASE        | Limb Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_LMP_SPARE1     | Limb Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_L_STEP_COUNT   | Limb Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_L_RETRIES      | Limb Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_L_DESTINATION  | Limb Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_LP_TEC_SETPT   | Commanded LP TEC Setpoint                                     | N/A                        | N/A                                                                        | Ŭ         |
| 312       | 16          | M_LP_HTR_SETPT   | Commanded LP CCD Window Heater Setpoint                       | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_L_POSITION     | Limb Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 344       | 8           | M_L_POS_ID       | Limb Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 352       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 360       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 368       | 16          | L_ROWS           | Rows of Limb Profiler CCD data                                | N/A                        | N/A                                                                        | U         |
| 384       | 16          | L_COLS           | Columns of Limb Profiler CCD data                             | N/A                        | N/A                                                                        | U         |
| 400       | 16          | L_IMG_STATUS     | Limb Image Processing Status Word                             | N/A                        | N/A                                                                        | U         |
|           |             |                  |                                                               |                            |                                                                            |           |

| Table 4.3.10 | OMPS Limb | Calibration | Packet U | Jser Data | Fields | (cont) |
|--------------|-----------|-------------|----------|-----------|--------|--------|
|--------------|-----------|-------------|----------|-----------|--------|--------|

| Start Bit | Bit  | Mpemonic Name    | Description                                                  | Units        | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | Data Type |
|-----------|------|------------------|--------------------------------------------------------------|--------------|--------------------------------------------------------|-----------|
| Start Dit | Size | When one warte   | Description                                                  | State Value  | State Name                                             | Data Type |
| 448       | 8    | L_PROFILE_ID     | Active Limb Profile ID                                       | N/A          | N/A                                                    | U         |
| 456       | 8    | L PROFILE VER    | Limb Imaging Profile Table Version Number major version      | N/A          | N/A                                                    | U         |
| 464       | 8    | L_PROFILE_VER    | Limb Imaging Profile Table Version Number minor version      | N/A          | N/A                                                    | U         |
| 472       | 16   | L_TIM_PAT_TBL    | Limb Timing Pattern Table ID                                 | N/A          | N/A                                                    | U         |
| 488       | 16   | L1_APID          | Limb Profiler Image #1 Application ID                        | N/A          | N/A                                                    | U         |
| 504       | 16   | L2_APID          | Limb Profiler Image #2 Application ID                        | N/A          | N/A                                                    | U         |
| 520       | 8    | L_LIN_CORR       | Limb Linearity Correction Flag                               | 0            | DISABLED<br>ENABLED                                    | U         |
| 528       | 16   | L LIN CORR TBL   | Limb Linearity Correction Table ID                           | N/A          | N/A                                                    | U         |
| 544       | 16   | L FIXED COADDS   | Limb Fixed Coadd Count                                       | N/A          | N/A                                                    | U         |
| 560       | 8    | L_REORDER_IMG    | Limb Reorder Image Flag                                      | 0            | DISABLED                                               | U         |
|           |      |                  |                                                              | 0            | DISABLED                                               |           |
| 568       | 8    | L_GAIN_CORR      | Limb Gain Correction Flag                                    | 1            | ENABLED                                                | U         |
| 576       | 16   | L GAIN CORR TBI  | Limb Gain Correction Table ID                                | N/A          | N/A                                                    | U         |
|           |      |                  |                                                              | 0            | DISABLED                                               |           |
| 592       | 8    | L1_BIN_IMG       | Limb Profiler Image #1 Bin Image Flag                        | 1            | ENABLED                                                | U         |
| 600       | 16   | L1_SAMP_TBL      | Limb Profiler Image #1 Sample Table ID                       | N/A          | N/A                                                    | U         |
| 616       | 8    | L2_BIN_IMG       | Limb Profiler Image #2 Bin Image Flag                        | 0            | DISABLED                                               | U         |
| 624       | 16   | L2_SAMP_TBL      | Limb Profiler Image #2 Sample Table ID                       | N/A          | N/A                                                    | U         |
| 640       | 8    | L_2ND_IMAGE      | Limb Profiler Second Image Flag                              | 0            | FALSE<br>TRUE                                          | U         |
| 648       | 8    | L GAIN TBL VER   | Limb Gain Table Version Number maior version                 | N/A          | N/A                                                    | U         |
| 656       | 8    | L GAIN TBL VER   | Limb Gain Table Version Number minor version                 | N/A          | N/A                                                    | U         |
| 664       | 8    | L LIN TBL VER    | Limb Linearity Correction Table Version Number major version | N/A          | N/A                                                    | U         |
| 672       | 8    | L_LIN_TBL_VER    | Limb Linearity Correction Table Version Number minor version | N/A          | N/A                                                    | U         |
| 680       | 8    | L1 SAMP TBL VER  | Limb Image #1 Sample Table Version Number major version      | N/A          | N/A                                                    | U         |
| 688       | 8    | L1_SAMP_TBL_VER  | Limb Image #1 Sample Table Version Number minor version      | N/A          | N/A                                                    | U         |
| 696       | 8    | L2_SAMP_TBL_VER  | Limb Image #2 Sample Table Version Number major version      | N/A          | N/A                                                    | U         |
| 704       | 8    | L2_SAMP_TBL_VER  | Limb Image #2 Sample Table Version Number minor version      | N/A          | N/A                                                    | U         |
| 712       | 8    | L1_LAST_IMG_DOY  | Time stamp of last good Limb Image #1 (day of year)          | N/A          | N/A                                                    | U         |
| 720       | 32   | L1_LAST_IMG_MSEC | Time stamp of last good Limb Image #1                        | milliseconds | N/A                                                    | U         |
| 752       | 16   | L1_LAST_IMG_USEC | Time stamp of last good Limb Image #1                        | microseconds | N/A                                                    | U         |
| 768       | 16   | L2_LAST_IMG_DOY  | Time stamp of last good Limb Image #2 (day of year)          | N/A          | N/A                                                    | U         |
| 784       | 32   | L2_LAST_IMG_MSEC | Time stamp of last good Limb Image #2                        | milliseconds | N/A                                                    | U         |
| 816       | 16   | L2_LAST_IMG_USEC | Time stamp of last good Limb Image #2                        | microseconds | N/A                                                    | U         |

Interstamp of last good Limb Im

| Bit<br>Size | it Zee Mnemonic Name Description                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Units<br>OR<br>State Value                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 16          | M L CAL LED                                                              | Current in the active Calibration LED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | milliamns                                                                                                                                                                                                                                                     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| 16          |                                                                          | Temperature - Motor Driver Board                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, -, -, 0.0484 -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 16          | L_T_TELESCOPE                                                            | Temperature - Limb Telescope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343; -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | s                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 16          | L_T_PRISM_1                                                              | Temperature - Limb Prism #1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | L_T_PRISM_2                                                              | Temperature - Limb Prism #2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| 16          | L_T_CCD                                                                  | Temperature - Limb CCD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, -, -, -, -0.0238, 58.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 16          | M_V_MTR_RES_5V                                                           | Voltage - Motor/Resolver Electronics +5V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Volts                                                                                                                                                                                                                                                         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| 16          | M_V_RES_12V                                                              | Voltage - Resolver Electronics +12V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Volts                                                                                                                                                                                                                                                         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| 16          | M_V_RES_M12V                                                             | Voltage - Resolver Electronics -12V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Volts                                                                                                                                                                                                                                                         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| 16          | L_T_MOTOR                                                                | Temperature - Limb Diffuser Motor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | L_T_HOUSING                                                              | Temperature - Limb Housing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | L_T_SUN_SIDE                                                             | Temperature - Limb Sun Side                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | L_T_DARK_SIDE                                                            | Temperature - Limb Dark Side                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     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| 16          | L_T_COND_BAR                                                             | Temperature - Limb Conductor Bar                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | L_T_WINDOW                                                               | Temperature - Limb Window                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 16          | L_P_HTR_SET                                                              | Power Setpoint - Limb CCD Window Heater                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Watts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | -, -, 5.76E-8,0,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 16          | L_T_SIG_BD                                                               | Temperature - Nadir Signal Board                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 16          | L_T_TIM_BD                                                               | Temperature - Nadir Timing Board                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 32          | N/A                                                                      | <ul> <li>HW Start Tag (if image is not sampled)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                                                                                                                                                                                                                                                           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| varies      | N/A                                                                      | CCD Data (# pixels x 32 bits/pixel)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                                                                                           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| 32          | N/A                                                                      | HW End Tag (if image is not sampled)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A                                                                                                                                                                                                                                                           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| 8           | N/A                                                                      | Pad Byte                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                                                                                                                                                                                                           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|             | 1 PR                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                               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|             | Size<br>Size<br>16<br>16<br>16<br>16<br>16<br>16<br>16<br>16<br>16<br>16 | Size         Mnemonic Name           16         M L CAL LED           16         M T_MTR_DRV_BD           16         L_T_TELESCOPE           16         L_T_PRISM_1           16         L_T_PRISM_2           16         L_T_CD           16         L_T_PRISM_2           16         L_T_CD           16         L_T_CD           16         M V MTR RES 5V           16         M V RES MI2V           16         L_T_MOTOR           16         L_T_HOUSING           16         L_T_SUN_SIDE           16         L_T_COND_BAR           16         L T_TIG BD           16         L T_TIG BD           32         N/A           32         N/A           8         N/A | Size         Mnemonic Name         Description           16         M.I.CAL, LED         Current in the active Calibration LED           16         M.T.MR.RV BD         Temperature - Limb Trelescope           16         L_T_FRISM_1         Temperature - Limb Prism #1           16         L_T_PRISM_2         Temperature - Limb Prism #1           16         M.V.RES.SV         Voltage - Resolver Electronics +5V           16         M.V.RES.SV         Voltage - Resolver Electronics +12V           16         M.V.RES.M12V         Voltage - Resolver Electronics +12V           16         M.V.RES.M12V         Voltage - Resolver Electronics +12V           16         L_T_MOTOR         Temperature - Limb Diffuser Motor           16         L_T_LOUSING         Temperature - Limb Diffuser Motor           16         L_T_LOUN_SIDE         Temperature - Limb Dark Side           16         L_T_COND_BAR         Temperature - Limb Dark Side           17         L.T.VINDOW         Temperature - Limb Motor           18         L.T_TOND_BAR         Temperat | Bits         Memoria Name         Description         OR<br>Battle Value           16         M.T. MTR. RW BD         Current in the active Californian LED         milliamps           18         L_T_TELESCOPE         Temperature - Limb Telescope         Caletius           16         L_T_PRISM_1         Temperature - Limb Prism #1         Caletius           16         L_T_PRISM_1         Temperature - Limb Prism #1         Caletius           16         L_T_PRISM_2         Temperature - Limb Prism #2         Caletius           16         L_T_ORIGN_2         Temperature - Limb COD         Colesius           16         L_T_ORIGN_2         Temperature - Limb COD         Colesius           16         M.V.RES.SIV         Voltage - Resolver Electronics +13V         Voltage           16         M.V.RES.MI2V         Voltage - Resolver Electronics +13V         Voltage           16         M_V.RES.MI2V         Voltage - Resolver Electronics +13V         Voltage           16         L_T_MOTOR         Temperature - Limb Diffuser Motor         Calesius           16         L_T_LOUSING         Temperature - Limb Dark Side         Calesius           16         L_T_LONDAR         Temperature - Limb Dark Side         Calesius           16         L_T_LONDAR <td< td=""><td>Solution         OR         PH           10         Mannet Bane         Construction         State Yare         State Yare           11         M. 1. CML LEP         Construction         State Yare         State Yare         State Yare           11         M. 1. CML LEP         Construction         State Yare         State Yare         State Yare         State Yare           14         LTELESCOPE         Temperature - Link Piezes         Column         State Yare         State Y</td></td<> | Solution         OR         PH           10         Mannet Bane         Construction         State Yare         State Yare           11         M. 1. CML LEP         Construction         State Yare         State Yare         State Yare           11         M. 1. CML LEP         Construction         State Yare         State Yare         State Yare         State Yare           14         LTELESCOPE         Temperature - Link Piezes         Column         State Yare         State Y |

## 4.3.7.3 Diagnostic Data

Each Science and each Calibration packet have a corresponding Diagnostic packet. These seven packets are configurable to resolve potential anomalies with the science and calibration data. They are output irregularly as needed. Because the diagnostic packets may be large compared to the operational packets, their output rate can be limited by the OMPS allocation on the 1553 Bus. All of these diagnostic packets are described below.

## 4.3.7.4 Diagnostic Nadir Total Column

The Diagnostic Nadir Total Column packet is output in APID 576 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. Currently, there is only one sample table for APID 576 and it is identical to the Earth View Nadir Total Column packet. So APID 576 will be a single group of 30 CCSDS packets with a total of 30138 octets. Figure 4.3-30, Figure 4.3-31, and Figure 4.3-32 below show the packet structure as currently baselined. More generic figures suitable for a different sized packet can be found in the Diagnostic Calibration packet sections. Table 4.3.11 lists the user data fields as if all fields were in a single packet.



Figure 4.3-30 OMPS Diagnostic Nadir Total Column First Packet Format

## NPP MDFCB

MIDDLE PACKET Qty. 28

| [      |             |           | PACKE      | T PRIMARY | HEADER   |          |            | User Data Field            |       |                      |
|--------|-------------|-----------|------------|-----------|----------|----------|------------|----------------------------|-------|----------------------|
|        | Verson      | Packe     | t Identifi | cation    | Packet S | Sequence | Packet     | Science                    |       |                      |
|        | No.         | Туре      | Sec Hdr    | APID      | Sequence | Sequence | Length     | CCD data (196 x 38 pixels) |       |                      |
|        |             | Indicator | Flag       |           | Flags    | Count    |            | (middle)                   |       |                      |
|        |             |           |            |           |          |          |            |                            | TOTAL | TOTAL Middle Packets |
| Bits   | 3           | 1         | 1          | 11        | 2        | 14       | 16         | 8144                       | 8192  | 229376               |
| Octets |             | :         | 2          |           |          | 2        | 2          | 1018                       | 1024  | 28672                |
| Value  | 000         | 0 /       | 0          | 0x240     | 00       | varies   | 0x03F9     | varies                     | I     |                      |
| Tel    | emetry Pack | et        |            | •         |          | Midd     | lle Packet | apple .                    | •     |                      |

Figure 4.3-31 OMPS Diagnostic Nadir Total Column Middle Packet Format

LAST PACKET

| ]      |             |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field                     |          |       |        |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------------------------|----------|-------|--------|
|        | Verson      | Packe             | t Identifi      | cation    | Packet            | Sequence          | Packet | Science                             |          |       |        |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data (196 x 38 pixels)<br>(end) | Pad Byte | TOTAL |        |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16     | 3480                                | 8        | 3536  | 241104 |
| Octets |             |                   | 2               |           |                   | 2                 | 2      | 435                                 | 1        | 442   | 30138  |
| Value  | 000         | 0 /               | 0               | 0x240     | 10                | varies            | 0x01B3 | varies                              | fixed    |       |        |
| Tel    | emetry Pack | et                |                 |           |                   | Last              | Packet |                                     |          |       |        |

Figure 4.3-32 OMPS Diagnostic Nadir Total Column Last Packet Format

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A<br>N/A                                                                                                             | U         |
| 32        | 8           | SENSOR ID        | OMPS Sensor Identification (not for Dwell or ESW Bootup status)                   | N/A<br>N/A                 | N/A<br>N/A                                                                                                             | <u> </u>  |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | Ŭ         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0<br>-1                    | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM SIDE      | EEPROM side used to boot                                                          | 0                          | Boot Side 1                                                                                                            | U         |
| 96        | 7           | M MCR SPARE6     | Unused bits of the Miscellaneous Control Register                                 | 1<br>N/A                   | Boot Side 2<br>N/A                                                                                                     | - u       |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0                          | OFF                                                                                                                    | U         |
| 104       | 3           | M MCR SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0                          | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 1                          | BUSY                                                                                                                   | U         |
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 139       | 1           | M TC TEC STATE   | State of the TC TEC Control                                                       | 0                          | OFF                                                                                                                    | U         |
| 140       | 3           | M THCB SPARE5    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | ON                                                                                                                     | u         |
| 142       | 1           | M NR TEC STATE   | State of the NP TEC Control                                                       | 0                          | OFF                                                                                                                    | <u> </u>  |
| 143       | '           |                  |                                                                                   | 1                          | ON                                                                                                                     | 0         |
| 144       | 3           | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register                         | N/A<br>0                   | OFF                                                                                                                    | U         |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                                                       | 1                          | ON                                                                                                                     | U         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                         | 0                          | OFF                                                                                                                    | U         |
|           |             | THE REAL         |                                                                                   |                            |                                                                                                                        |           |

| Table 4.3.11 | OMPS Diagnostic Nadir | <b>Total Column Packet</b> | User Data Fields | (cont) |
|--------------|-----------------------|----------------------------|------------------|--------|
|--------------|-----------------------|----------------------------|------------------|--------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A<br>OFF                                                                 | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 1                          | OFF<br>ON                                                                  | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A<br>0                   | N/A<br>OFF                                                                 | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 1                          | ON<br>DWD ENNDLED                                                          | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0                          | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0                          | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0                          | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
|           |             | BA               | y                                                         |                            |                                                                            |           |

| Table 4.3.11 | OMPS Diagnostic Nadir | <b>Total Column Packet</b> | User Data Fields | (cont) |
|--------------|-----------------------|----------------------------|------------------|--------|
|--------------|-----------------------|----------------------------|------------------|--------|

| Start Bit | Bit<br>Size    | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name       | Data Type |  |  |
|-----------|----------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------|-----------|--|--|
| 200       | 3              | M_MCSR_SPARE2    | Unused register bits                                           | 0<br>1                     | OPEN<br>CLOSED                                                                   | U         |  |  |
| 203       | 1              | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                              | U         |  |  |
| 204       | 3              | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                                   | U         |  |  |
| 207       | 1              | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0<br>1                     | OFF<br>ON                                                                        | U         |  |  |
| 208       | 1              | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                                 | U         |  |  |
| 209       | 15             | M_N_RESOLV_SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                              | U         |  |  |
| 224       | 16             | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                              | U         |  |  |
| 240       | 7              | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                        | U         |  |  |
| 247       | 1              | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CW<br>CCW                                                                        | U         |  |  |
| 248       | 2              | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                        | U         |  |  |
| 250       | 2              | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10                  | U         |  |  |
| 252       | 2              | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW                                                                               | U         |  |  |
| 254       | 2              | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS<br>A_PLUS_B_MINUS | U         |  |  |
| 256       | 4              | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                        | U         |  |  |
| 260       | 12             | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                              | U         |  |  |
| 272       | 8              | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                              | U         |  |  |
| 280       | 16             | M_N_DESTINATION  | Nadir Diffuser Move Destination                                | N/A                        | N/A                                                                              | U         |  |  |
| 296       | 16             | M_IC_IEC_SEIPI   | Commanded TC TEC Setpoint                                      | N/A                        | N/A                                                                              | <u> </u>  |  |  |
| 312       | 16             | M_IC_HIR_SEIPI   | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                              | 0         |  |  |
| 320       | 16             |                  | Commanded NP CCD Minday Haster Settaint                        | N/A                        | N/A                                                                              | 0         |  |  |
| 344       | 16             |                  | Nedir Diffusor Motor Desition                                  | N/A<br>N/A                 | N/A                                                                              |           |  |  |
| 376       | 8              |                  | Nadir Diffuser Resition ID                                     | N/A                        | N/A                                                                              | <u> </u>  |  |  |
| 384       | 8              | N TIM PAT VER    | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                              | U U       |  |  |
| 392       | 8              | N TIM PAT VER    | Nadir Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                              | U U       |  |  |
| 400       | 16             | N IMG STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                              | U U       |  |  |
| 416       | 32             | N INT HOLD TIME  | Nadir TPG Integration Hold Time                                | milliseconds               | 0.1.0                                                                            | Ū         |  |  |
|           | HBHT CHOING BE |                  |                                                                |                            |                                                                                  |           |  |  |

| Table 4.3.11 | <b>OMPS</b> Diagnostic | <b>Nadir Total</b> | <b>Column Packet</b> | <b>User Data</b> | Fields (c | ont) |
|--------------|------------------------|--------------------|----------------------|------------------|-----------|------|
|--------------|------------------------|--------------------|----------------------|------------------|-----------|------|

| Bit<br>Size | Mnemonic Name                                                                                                                                                            | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 8           | N_PROFILE_ID                                                                                                                                                             | Active Nadir Profile ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 8           | N_PROFILE_VER                                                                                                                                                            | Nadir Imaging Profile Table Version Number major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 8           | N_PROFILE_VER                                                                                                                                                            | Nadir Imaging Profile Table Version Number minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 16          | N_TIM_PAT_TBL                                                                                                                                                            | Nadir Timing Pattern Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 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| 16          | TC_APID                                                                                                                                                                  | Nadir Total Column Application ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 8           | TC_LIN_CORR                                                                                                                                                              | Nadir Total Column Linearity Correction Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | TC_LIN_CORR_TBL                                                                                                                                                          | Nadir Total Column Linearity Correction Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| 16          | TC_FIXED_COADDS                                                                                                                                                          | Nadir Total Column Fixed Coadd Count                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 8           | TC_REORDER_IMG                                                                                                                                                           | Nadir Total Column Reorder Image Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 8           | TC_GAIN_CORR                                                                                                                                                             | Nadir Total Column Gain Correction Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       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| 16          | TC_GAIN_CORR_TBL                                                                                                                                                         | Nadir Total Column Gain Correction Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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| 8           | TC_BIN_IMG                                                                                                                                                               | Nadir Total Column Bin Image Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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| 16          | TC SAMP TBL                                                                                                                                                              | Nadir Total Column Sample Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 8           | NP_LIN_CORR                                                                                                                                                              | Nadir Profiler Linearity Correction Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 16          | NP LIN CORR TBI                                                                                                                                                          | Nadir Profiler Linearity Correction Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | NP FIXED COADDS                                                                                                                                                          | Nadir Profiler Eired Coadd Count                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              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| 8           | NP_REORDER_IMG                                                                                                                                                           | Nadir Profilier Reorder Image Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            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| 8           | NP_GAIN_CORR                                                                                                                                                             | Nadir Profilier Gain Correction Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 16          | NP GAIN CORR TBL                                                                                                                                                         | Nadir Profilier Gain Correction Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 0           | NP_BIN_IMG                                                                                                                                                               | Nadir Promier Bin Image Flag                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  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| 16          | NP_SAMP_TBL                                                                                                                                                              | Nadir Profilier Sample Table ID                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 8           | TC_GAIN_TBL_VER                                                                                                                                                          | Nadir Total Column Gain Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| 8           | TC_GAIN_TBL_VER                                                                                                                                                          | Nadir Total Column Gain Table Version minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           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| 8           | NP_GAIN_TBL_VER                                                                                                                                                          | Nadir Profiler Gain Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 8           | NP_GAIN_TBL_VER                                                                                                                                                          | Nadir Profiler Gain Table Version minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               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| 8           | TC_LIN_TBL_VER                                                                                                                                                           | Nadir Total Column Linearity Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 8           | TC_LIN_TBL_VER                                                                                                                                                           | Nadir Total Column Linearity Table Version minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      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| 8           | NP_LIN_TBL_VER                                                                                                                                                           | Nadir Profiler Linearity Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 8           |                                                                                                                                                                          | Nadir Profiler Linearity Table Version minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          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| 8           | TC_SAMP_TBL_VER                                                                                                                                                          | Nadir Total Column Sample Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 8           | TC_SAMP_TBL_VER                                                                                                                                                          | Nadir Total Column Sample Table Version minor version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         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| 8           | NP_SAMP_TBL_VER                                                                                                                                                          | Nadir Profiler Sample Table Version major version                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             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|             | Bit<br>Size<br>8<br>8<br>8<br>8<br>16<br>16<br>16<br>16<br>16<br>8<br>16<br>16<br>8<br>8<br>16<br>8<br>16<br>8<br>16<br>8<br>8<br>16<br>8<br>8<br>16<br>8<br>8<br>8<br>8 | Bit     Mnemonic Name       8     N PROFILE ID       8     N PROFILE VER       8     N PROFILE VER       16     N TIM PAT TBL       16     TC_APID       16     TC_LIN_CORR       16     TC_REORDER_IMG       8     TC_GAIN_CORR       16     TC_BIN_IMG       16     TC_BIN_IMG       16     TC_BIN_IMG       16     TC_BIN_IMG       16     TC_SAMP_TBL       8     NP_LIN_CORR       16     NP_LIN_CORR       16     NP_LIN_CORR       16     NP_LIN_CORR       16     NP_GAIN_CORR       16     NP_GAIN_CORR       16     NP_GAIN_CORR       16     NP_GAIN_CORR       16     NP_GAIN_CORR       16     NP_GAIN TBL VER       8     NC_GAIN TBL VER       8     TC_GAIN TBL VER       8     NP_GAIN TBL VER       8     TC_IN TBL VER       8     NP_LIN TBL VER       8     TC_SAMP TBL VER       8     TC_SAMP TBL VER       8     TC_SAMP TBL VER       8     TC_SAMP TBL VER       8     NP_SAMP_TBL VER       8     NP_SAMP_TBL VER       8     NP_SAMP_TBL VE | Bit<br>State         Meemonic Name         Description           8         N. PROFILE ID         Active Naidr Profile Table Version Number - major version           8         N. PROFILE VER         Naidr Irninging Profile Table Version Number - major version           16         N. TIM PAT TEL         Naidr Total Column Application ID           16         N. T. TIM PAT         Naidr Total Column Linearity Correction Falls           16         N. T. APID         Naidr Total Column Linearity Correction Falls           16         T.C. LIN CORR         Naidr Total Column Linearity Correction Falls           16         T.C. LIN CORR TBL         Naidr Total Column Bit Total Column Street Correction Falls           16         T.C. CREORDER_IMG         Naidr Total Column Bit Total Column Bit Total Column Street Correction Falls           17         C. SAM TOL         Naidr Total Column Bit Total Colum Column Bit Total Column B | Bit<br>State         Memorine Name         Description         OR<br>State Value           8         N PROFILE VER         Nadir Imaging Profile Table Version Number - minor version         NiA           8         N PROFILE VER         Nadir Imaging Profile Table Version Number - minor version         NiA           8         N PROFILE VER         Nadir Imaging Profile Table Version Number - minor version         NiA           16         TG LAND         Nadir Timaging Profile Table Version Number - minor version         NiA           16         TG LUN CORR TBL         Nadir Total Column Linearly Correction Flag         1           16         TC LUN CORR TBL         Nadir Total Column Reards (mage Flag         0           18         TC C, GAND CORR TBL         Nadir Total Column Reards (mage Flag         0           18         TC C, GAND CORR TBL         Nadir Total Column Reards (mage Flag         0           18         TC C, GAND CORR TBL         Nadir Total Column Reards (mage Flag         0           16         TC G, GAND CORR TBL         Nadir Total Column Sample Table ID         NiA           18         TC L, BLONDER         Nadir Total Column Sample Table ID         NiA           16         TC G, GAND CORR TBL         Nadir Profiler Rearcore Image Flag         0           16         TC G, SAMP TBL | Macrown Name         Description         OR<br>State Value         OR<br>State Val |

| Table 4.3.11 | OMPS Diagnostic Nadir | <b>Total Column Packe</b> | t User Data Fields (cont) |
|--------------|-----------------------|---------------------------|---------------------------|
|--------------|-----------------------|---------------------------|---------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type |
|-----------|-------------|------------------|------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 808       | 16          | TC_ROWS          | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 824       | 16          | TC_COLS          | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 840       | 16          | TC_LAST_IMG_DOY  | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 856       | 32          | TC_LAST_IMG_MSEC | Time stamp of last good TC image               | milliseconds               | N/A                                                                                                                                                                                                                                | U         |
| 888       | 16          | TC_LAST_IMG_USEC | Time stamp of last good TC image               | microseconds               | N/A                                                                                                                                                                                                                                | U         |
| 904       | 16          | M_I_CAL_LED      | Current in the active Calibration LED          | milliamps                  | -, -, -, 0.005086, 0                                                                                                                                                                                                               | S         |
| 920       | 16          | M_T_MTR_DRV_BD   | Temperature - Motor Driver Board               | Celsius                    | -, -, -, 0.0484, -273.15                                                                                                                                                                                                           | S         |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 952       | 16          | TC_T_CCD         | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 968       | 16          | NP_T_CCD         | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 984       | 16          | M_V_MTR_RES_5V   | Voltage - Motor/Resolver Electronics +5V       | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1000      | 16          | M_V_RES_12V      | Voltage - Resolver Electronics +12V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1016      | 16          | M_V_RES_M12V     | Voltage - Resolver Electronics -12V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.661E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83' -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83' -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83' -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1128      | 16          | TC_P_HTR_SET     | Power Setpoint - TC Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                             |           |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts                      | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                             | S         |
| 1160      | 16          | N_T_SIG_BD       | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                           | S         |
| 1176      | 16          | N_T_TIM_BD       | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1208      | 16          | NP_T_WINDOW      | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1224      | 16          | TC_T_WINDOW      | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1240      | 238336      | N/A              | CCD Data (196 x 38 pixels x 32 bits/pixel)     | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 239576    | 8           | N/A              | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                | U         |
|           |             | - B              |                                                |                            |                                                                                                                                                                                                                                    |           |

## 4.3.7.5 Diagnostic Nadir Profiler

The Diagnostic Nadir Profiler packet is output in APID 577 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. Currently, there is only one sample table for APID 577 and it is identical to the Earth View Nadir Profiler packet. So APID 577 will be a single group of 2 CCSDS packets with a total of 1354 octets. Figure 4.3-33 and Figure 4.3-34 below show the packet structure as currently baselined. More generic figures suitable for a different sized packet can be found in the Diagnostic Calibration packet sections. Table 4.3.10 lists the user data fields as all data were in a single packet.



## Figure 4.3-34 OMPS Diagnostic Nadir Profiler Last Packet Format

| Start Bit | Bit<br>Size | Mnemonic Name            | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                              | Data Type |
|-----------|-------------|--------------------------|-----------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER            | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                     | U         |
| 16        | 8           | CCSDS_CONT_COUNT         | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A                                                                                                                     | U         |
| 24        | 8           | CCSDS_CONT_FLAG          | Indicates if this CCSDS packet begins an RDR                                      | N/A                        | N/A                                                                                                                     | U         |
| 32        | 8           | SENSOR_ID<br>ESW_VERSION | Elight Software Version Number (not for Dwell or FSW Bootup status)               | N/A<br>N/A                 | N/A                                                                                                                     |           |
| 48        | 8           | FSW VERSION              | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                     | Ŭ         |
| 56        | 2           | MEB_BOOT_IMG_ID          | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDM-which we should never boot from) | U         |
| 58        | 5           | MEB SBC ID               | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                     | U         |
| 63        | 1           | MEB_SIDE                 | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                            | U         |
| 64        | 8           | FSW_INIT_STATUS          | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0<br>-1                    | OK<br>ERROR                                                                                                             | U         |
| 72        | 8           | FSW_INIT_CODE            | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                     | U         |
| 80        | 8           | FSW_PROTECTED            | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                                | U         |
| 88        | 4           | MEB_FLASH_PWR            | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 92        | 4           | EEPROM_SIDE              | EEPROM side used to boot                                                          | 0<br>1                     | Boot Side 1<br>Boot Side 2                                                                                              | U         |
| 96        | 7           | M_MCR_SPARE6             | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 103       | 1           | M_MCR_L_SP_CTRL          | Limb Signal Processing Spare Control                                              | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 104       | 3           | M_MCR_SPARE5             | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 107       | 1           | M_MCR_N_SP_CTRL          | Nadir Signal Processing Spare Control                                             | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 108       | 3           | M_MCR_SPARE4             | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 111       | 1           | M_MCR_TEST_2             | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 112       | 7           | M_MCR_SPARE3             | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                     | U         |
| 119       | 9           | M_CAL_LED_STATE          | State of the Calibration LEDs                                                     | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 128       | 7           | M_THCR_SPARE7            | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 135       | 1           | M_THCR_DAC_BUSY          | State of the DACBUSY line                                                         | 0<br>1                     | NOT_BUSY<br>BUSY                                                                                                        | U         |
| 136       | 3           | M_THCR_SPARE6            | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 139       | 1           | M_TC_TEC_STATE           | State of the TC TEC Control                                                       | 0                          | OFF<br>ON                                                                                                               | U         |
| 140       | 3           | M_THCR_SPARE5            | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 143       | 1           | M_NP_TEC_STATE           | State of the NP TEC Control                                                       | 0                          | OFF<br>ON                                                                                                               | U         |
| 144       | 3           | M_THCR_SPARE4            | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 147       | 1           | M_LP_TEC_STATE           | State of the LP TEC Control                                                       | 0<br>1                     | OFF<br>ON                                                                                                               | U         |
| 148       | 3           | M_THCR_SPARE3            | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                     | U         |
| 151       | 1           | M_TC_HTR_STATE           | State of the TC CCD Window Heater Control                                         | 0                          | OFF<br>ON                                                                                                               | U         |
|           |             | - BR                     |                                                                                   |                            |                                                                                                                         |           |

# Table 4.3.12 OMPS Diagnostic Nadir Profiler Packet User Data Fields

| Table 4.3.12 | OMPS Diagnostic Nadir Profiler Packet User Data Fields (cont) |
|--------------|---------------------------------------------------------------|
|--------------|---------------------------------------------------------------|

|           |             |                  | -                                                         | 1                          |                                                                            | -         |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
|           |             | - Cor            |                                                           |                            |                                                                            |           |

| Table 4.3.12 | OMPS Diagnostic Nadir Profiler Packet User Data Fields ( | cont) |
|--------------|----------------------------------------------------------|-------|
|              |                                                          |       |

| Start Bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|--|
| 200                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |  |
| 203                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0<br>1                     | DISABLED<br>ENABLED                                                        | U         |  |
| 204                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |  |
| 207                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0<br>1                     | OFF<br>ON                                                                  | U         |  |
| 208                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |  |
| 209                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 15          | M_N_RESOLV_SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |  |
| 224                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |  |
| 240                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |  |
| 247                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |  |
| 248                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2           | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |  |
| 250                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |  |
| 252                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |  |
| 254                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLOS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |  |
| 256                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |  |
| 260                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                        | U         |  |
| 272                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8           | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                        | U         |  |
| 280                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          | M_N_DESTINATION  | Nadir Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |  |
| 296                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          | M_TC_TEC_SETPT   | Commanded TC TEC Setpoint                                      | N/A                        | N/A                                                                        | U         |  |
| 312                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          |                  | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | 0         |  |
| 328                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          |                  | Commanded NP CED Window Upster Settaint                        | N/A                        | N/A                                                                        | 0         |  |
| 360                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          |                  | Nadir Diffuser Motor Position                                  | N/A                        | N/A                                                                        | 0         |  |
| 376                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8           | M N POS ID       | Nadir Diffuser Position ID                                     | N/A                        | N/A                                                                        |           |  |
| 384                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8           |                  | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U U       |  |
| 392                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 8           | N TIM PAT VER    | Nadir Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | ŭ         |  |
| 400                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 16          | N IMG STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                        | Ŭ         |  |
| 416                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 32          | N INT HOLD TIME  | Nadir TPG Integration Hold Time                                | milliseconds               | 0.1.0                                                                      | Ŭ         |  |
| THE REAL PROPERTY OF THE PROPE |             |                  |                                                                |                            |                                                                            |           |  |

| Table 4.3.12 | OMPS Diagnostic Nadir Profiler Packet User Data Fields (cont) |  |
|--------------|---------------------------------------------------------------|--|
|              |                                                               |  |

| Start Bit | Bit<br>Size       | Mnemonic Name    | Description                                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |  |  |  |
|-----------|-------------------|------------------|----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|--|--|--|
| 448       | 8                 | N_PROFILE_ID     | Active Nadir Profile ID                                  | N/A                        | N/A                                                                        | U         |  |  |  |
| 456       | 8                 | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number major version | N/A                        | N/A                                                                        | U         |  |  |  |
| 464       | 8                 | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number minor version | N/A                        | N/A                                                                        | U         |  |  |  |
| 472       | 16                | N_TIM_PAT_TBL    | Nadir Timing Pattern Table ID                            | N/A                        | N/A                                                                        | U         |  |  |  |
| 488       | 16                | TC_APID          | Nadir Total Column Application ID                        | N/A                        | N/A                                                                        | U         |  |  |  |
| 504       | 16                | NP_APID          | Nadir Profiler Application ID                            | N/A                        | N/A                                                                        | U         |  |  |  |
| 520       | 8                 | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 528       | 16                | TC_LIN_CORR_TBL  | Nadir Total Column Linearity Correction Table ID         | N/A                        | N/A                                                                        | U         |  |  |  |
| 544       | 16                | TC_FIXED_COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A                        | N/A                                                                        | U         |  |  |  |
| 560       | 8                 | TC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 568       | 8                 | TC_GAIN_CORR     | Nadir Total Column Gain Correction Flag                  | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 576       | 16                | TC_GAIN_CORR_TBL | Nadir Total Column Gain Correction Table ID              | N/A                        | N/A                                                                        | U         |  |  |  |
| 592       | 8                 | TC_BIN_IMG       | Nadir Total Column Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 600       | 16                | TC SAMP TBL      | Nadir Total Column Sample Table ID                       | N/A                        | N/A                                                                        | U         |  |  |  |
| 616       | 8                 | NP_LIN_CORR      | Nadir Profiler Linearity Correction Flag                 | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 624       | 16                | NP LIN CORR TBL  | Nadir Profiler Linearity Correction Table ID             | N/A                        | N/A                                                                        | U         |  |  |  |
| 640       | 16                | NP FIXED COADDS  | Nadir Profiler Fixed Coadd Count                         | N/A                        | N/A                                                                        | Ŭ         |  |  |  |
| 656       | 8                 | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 664       | 8                 | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 672       | 16                | NP GAIN CORR TBL | Nadir Profilier Gain Correction Table ID                 | N/A                        | N/A                                                                        | U         |  |  |  |
| 688       | 8                 | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 0                          | DISABLED<br>ENABLED                                                        | U         |  |  |  |
| 696       | 16                | NP SAMP TBL      | Nadir Profilier Sample Table ID                          | N/A                        | N/A                                                                        | U         |  |  |  |
| 712       | 8                 | TC GAIN TBL VER  | Nadir Total Column Gain Table Version major version      | N/A                        | N/A                                                                        | Ū         |  |  |  |
| 720       | 8                 | TC GAIN TBL VER  | Nadir Total Column Gain Table Version minor version      | N/A                        | N/A                                                                        | Ŭ         |  |  |  |
| 728       | 8                 | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A                        | N/A                                                                        | U         |  |  |  |
| 736       | 8                 | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version minor version          | N/A                        | N/A                                                                        | U         |  |  |  |
| 744       | 8                 | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A                        | N/A                                                                        | U         |  |  |  |
| 752       | 8                 | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version minor version | N/A                        | N/A                                                                        | U         |  |  |  |
| 760       | 8                 | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A                        | N/A                                                                        | U         |  |  |  |
| 768       | 8                 | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version minor version     | N/A                        | N/A                                                                        | U         |  |  |  |
| 776       | 8                 | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A                        | N/A                                                                        | U         |  |  |  |
| 784       | 8                 | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version minor version    | N/A                        | N/A                                                                        | U         |  |  |  |
| 792       | 8                 | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A                        | N/A                                                                        | U         |  |  |  |
| 800       | 8                 | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version minor version        | N/A                        | N/A                                                                        | U         |  |  |  |
|           | HRAT CHOILDING BU |                  |                                                          |                            |                                                                            |           |  |  |  |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type  |
|-----------|-------------|------------------|------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 808       | 16          | NP ROWS          | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                | U          |
| 824       | 16          | NP COLS          | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                | - ŭ        |
| 840       | 16          | NP LAST IMG DOY  | Time stamp of last good TC image (day of year) | N/A                        | N/A                                                                                                                                                                                                                                | Ŭ          |
| 856       | 32          | NP LAST IMG MSEC |                                                | milliseconds               | N/A                                                                                                                                                                                                                                | - ŭ        |
| 888       | 16          | NP LAST IMG USEC |                                                | microseconds               | N/A                                                                                                                                                                                                                                | — <u> </u> |
| 904       | 16          |                  | Current in the active Calibration LED          | milliamos                  | 0.005086.0                                                                                                                                                                                                                         | Š          |
| 920       | 16          |                  | Temperature - Motor Driver Board               | Celsius                    | , , , , , 0.0484 -273 15                                                                                                                                                                                                           | S          |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 952       | 16          | TC T CCD         | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S          |
| 968       | 16          | NP T CCD         | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S          |
| 984       | 16          | M V MTR RES 5V   | Voltage - Motor/Resolver Electronics +5V       | Volts                      | 0.00311.0                                                                                                                                                                                                                          | S          |
| 1000      | 16          | M V RES 12V      | Voltage - Resolver Electronics +12V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S          |
| 1016      | 16          | M V RES M12V     | Voltage - Resolver Electronics -12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                          | S          |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S          |
| 1128      | 16          | TC_P_HTR_SET     | Power Setpoint - TC Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                |            |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                | S          |
| 1160      | 16          | N_T_SIG_BD       | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                           | S          |
| 1176      | 16          | N_T_TIM_BD       | Temperature - Nadir Timing Board               | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S          |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s          |
| 1208      | 16          | NP T WINDOW      | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S          |
| 1224      | 16          | TC T WINDOW      | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S          |
| 1240      | 9408        | N/A              | CCD Data (147 x 2 pixels x 32 bits/pixel)      | N/A                        | N/A                                                                                                                                                                                                                                | - Ū        |
| 10648     | 8           | N/A              | Pad Byte                                       | N/A                        | N/A                                                                                                                                                                                                                                | Ū          |
|           |             |                  |                                                |                            | ·                                                                                                                                                                                                                                  |            |

## Table 4.3.12 OMPS Diagnostic Nadir Profiler Packet User Data Fields (cont)

## 4.3.7.6 Diagnostic Limb Profiler Long Exposure

The Diagnostic Limb Profiler Long (L1) Exposure packet is output in APID 578 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. Currently, there is only one sample table for APID 578 and it is identical to the Earth View Limb Profiler Long packet. So APID 578 will be a single group of 168 CCSDS packets with a total of 172000 octets. Figure 4.3-35, Figure 4.3-36, and Figure 4.3-37 below show the packet structure as currently baselined. More generic figures suitable for a different sized packet can be found in the Diagnostic Calibration packet sections. Table 4.3.13 lists the user data fields as if all data were in a single packet.

| FIRST PACK | ET                                           |                           |                 |        |                   |                   |          |            |             |                   |                |                  |           |            |             |                   |                     |      |
|------------|----------------------------------------------|---------------------------|-----------------|--------|-------------------|-------------------|----------|------------|-------------|-------------------|----------------|------------------|-----------|------------|-------------|-------------------|---------------------|------|
|            |                                              | PACKET PRIMARY HEADER     |                 |        |                   |                   |          | SE         | CONDARY HEA | DER               |                |                  |           | User D     | ata Field   |                   |                     |      |
|            | Verson No.                                   | No. Packet Identification |                 | Packet | Sequence          | Packet            | Start of | Packets ir | n Spare     |                   | OPMS Heade:    | þ                | E         | ngineering | Data        | Science           |                     |      |
|            |                                              | Type<br>Indicator         | Sec Hdr<br>Flag | APID   | Sequence<br>Flags | Sequence<br>Count | Length   | Scan       | RDR<br>- 1  |                   | RDR<br>Version | Cont Count<br>-1 | Cont Flag | Engin      | eering Data | Sections          | CCD data<br>(start) |      |
| Bits       | 3                                            | 1                         | 1               | 11     | 2                 | 14                | 16       | 64         | 8           | 8                 | 16             | 8                | 8         |            | 1032        |                   | 7000                |      |
| Octets     |                                              |                           | 2               |        |                   | 2                 | 2        | 8          | 1           | 1                 | 2              | 1                | 1         |            | 129         |                   | 875                 | 1024 |
| Value      | 000                                          | , 0                       | 1               | 0x242  | 01                | varies            | 0x03F9   | varies     | 0x40        | 0x00              | varies         | varies           | varies    |            | varies      |                   | varies              |      |
|            | Telemetry Packet Secondary<br>Header Present |                           |                 |        |                   |                   |          |            |             |                   |                |                  |           |            |             |                   |                     |      |
|            |                                              |                           |                 |        |                   |                   |          |            |             | Engine            | eering Data    | -                |           |            |             |                   |                     |      |
|            |                                              |                           |                 |        | o (7)             | Mech_SD<br>(59)   | (63)     | SD (72)    | (65)        | rofile_SD<br>(51) | D (67)         | D (26)           | SD (30)   | SD (29)    | SD (42)     | Temp_Limb<br>(25) |                     |      |
|            |                                              |                           |                 |        | 64                | 112               | 88       | 56         | 96          | 264               | 64             | 16               | 16        | 64         | 48          | 144               |                     |      |
|            |                                              |                           |                 |        | 8                 | 14                | 11       | 7          | 12          | 33                | 8              | 2                | 2         | 8          | 6           | 18                |                     |      |
|            |                                              |                           |                 |        | varies            | varies            | varies   | varies     | varies      | varies            | varies         | varies           | varies    | varies     | varies      | varies            |                     |      |
|            |                                              |                           |                 |        |                   |                   |          |            |             |                   |                |                  |           |            |             |                   |                     |      |

Figure 4.3-35 OMPS Diagnostic Limb Profiler Long Exposure First Packet Format

OMF. BHILCHOURDHIN

## NPP MDFCB

MIDDLE PACKET Qty. 166

|        |               |                   | PACKI           | T PRIMARY | HEADER            |                   |           | User Data Field      |       |                      |
|--------|---------------|-------------------|-----------------|-----------|-------------------|-------------------|-----------|----------------------|-------|----------------------|
|        | Verson No.    | Packe             | t Identifi      | cation    | Packet :          | Sequence          | Packet    | Science              |       |                      |
|        |               | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length    | CCD data<br>(middle) | TOTAL | TOTAL Middle Packets |
| Bits   | 3             | 1                 | 1               | 11        | 2                 | 14                | 16        | 8144                 | 8192  | 1359872              |
| Octets |               |                   | 2               |           |                   | 2                 | 2         | 1018                 | 1024  | 169984               |
| Value  | 000           | 0 /               | 0               | 0x242     | 00                | varies            | 0x03F9    | varies               |       |                      |
| Те     | lemetry Packe | it                |                 |           |                   | Midd              | le Packet | Ph Ro.               | -     |                      |

Figure 4.3-36 OMPS Diagnostic Limb Profiler Long Exposure Middle Packet Format

LAST PACKET

|        |               |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field   |          |      |  |
|--------|---------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------|----------|------|--|
|        | Verson No.    | Packe             | t Identifi      | cation    | Packet            | Sequence          | Packet | Science           |          |      |  |
|        |               | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | Pad Byte | Тота |  |
| Bits   | 3             | 1                 | 1               | 11        | 2                 | 14                | 16     | 7880              | 8        | 7936 |  |
| Octets |               | 2                 | 2               |           |                   | 2                 | 2      | 985               | 1        | 992  |  |
| Value  | 000           | 0 /               | 0               | 0x242     | 10                | varies            | 0x03D9 | varies            | fixed    |      |  |
| Te     | lemetry Packe | t                 |                 |           |                   | Last              | Packet |                   |          |      |  |

RDR TOTAL 1376000 172000

Figure 4.3-37 OMPS Diagnostic Limb Profiler Long Exposure Last Packet Format

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

BATCHOITOR

| Table 4.3.13 | <b>OMPS</b> Diagnostic Limb | Profiler Long Exp | oosure Packet User | Data Fields |
|--------------|-----------------------------|-------------------|--------------------|-------------|
|              |                             |                   |                    |             |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | <u> </u>  |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A<br>N/A                 | N/A                                                                                                                    |           |
| 32        | 8           | SENSOR ID        | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A                                                                                                                    | - ŭ       |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | Ū         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0                          | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1 0                        | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0                          | Boot Side 1                                                                                                            | U         |
| 96        | 7           | M MCR SPARE6     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 104       | 3           | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 1                          | OFF                                                                                                                    | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 0<br>1                     | NOT_BUSY<br>BUSY                                                                                                       | U         |
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                                                       | 0                          | OFF                                                                                                                    | U         |
| 140       | 3           | M THCR SPARE5    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 143       | 1           | M NP TEC STATE   | State of the NP TEC Control                                                       | 0                          | OFF                                                                                                                    | U         |
| 144       | 3           | M THCR SPARE4    | Unused hits of the TEC & Heater Control & Status Register                         | 1<br>N/A                   | ON                                                                                                                     |           |
| 447       |             |                  | Onded bits of the FEO & realer Control & Otatus Register                          | 0                          | OFF                                                                                                                    |           |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                                                       | 1                          | ON                                                                                                                     | 0         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    |           |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                         | 1                          | ON                                                                                                                     | U         |
|           |             | TR               |                                                                                   |                            |                                                                                                                        |           |

| Table 4.3.13 | <b>OMPS</b> Diagnostic | <b>Limb Profiler Long</b> | <b>Exposure Packe</b> | t User Data Fields (cont | t) |
|--------------|------------------------|---------------------------|-----------------------|--------------------------|----|
|--------------|------------------------|---------------------------|-----------------------|--------------------------|----|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0                          | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0                          | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
|           |             | - Bu             |                                                           |                            |                                                                            |           |

| Table 4.3.13 | <b>OMPS</b> Diagnostic | Limb Profiler Long | JExposure Packe | t User Data Fields | (cont) |
|--------------|------------------------|--------------------|-----------------|--------------------|--------|
|--------------|------------------------|--------------------|-----------------|--------------------|--------|

|           |             |                  |                                                               |                            | A                                                                          |           |
|-----------|-------------|------------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_L_RESOLV_BUSY  | Limb Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M_L_RESOLV_SPARE | Limb Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_L_RESOLV_DATA  | Limb Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |
| 240       | 7           | M_LMP_SPARE4     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_L_DIRECTION    | Limb Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_LMP_SPARE3     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_L_SPEED        | Limb Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_LMP_SPARE2     | Limb Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_L_PHASE        | Limb Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLOS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_LMP_SPARE1     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_L_STEP_COUNT   | Limb Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_L_RETRIES      | Limb Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_L_DESTINATION  | Limb Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_LP_TEC_SETPT   | Commanded LP TEC Setpoint                                     | N/A                        | N/A                                                                        | U         |
| 312       | 16          | M_LP_HTR_SETPT   | Commanded LP CCD Window Heater Setpoint                       | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_L_POSITION     | Limb Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 344       | 8           | M_L_POS_ID       | Limb Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 352       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 360       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 368       | 16          | L_ROWS           | Rows of Limb Profiler CCD data                                | N/A                        | N/A                                                                        | U         |
| 384       | 16          | L_COLS           | Columns of Limb Profiler CCD data                             | N/A                        | N/A                                                                        | U         |
| 400       | 16          | L_IMG_STATUS     | Limb Image Processing Status Word                             | N/A                        | N/A                                                                        | U         |
| 416       | 32          | L_INT_HOLD_TIME  | Limb TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             | - MA             |                                                               |                            |                                                                            |           |

| Start Bit | Bit<br>Size | Mnemonic Name   | Description                                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|-----------------|--------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | L PROFILE ID    | Active Limb Profile ID                                       | N/A                        | N/A                                                                        | U         |
| 456       | 8           | L_PROFILE_VER   | Limb Imaging Profile Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 464       | 8           | L_PROFILE_VER   | Limb Imaging Profile Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 472       | 16          | L_TIM_PAT_TBL   | Limb Timing Pattern Table ID                                 | N/A                        | N/A                                                                        | U         |
| 488       | 16          | L1_APID         | Limb Profiler Image #1 Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | L2_APID         | Limb Profiler Image #2 Application ID                        | N/A                        | N/A                                                                        | U         |
| 520       | 8           | L_LIN_CORR      | Limb Linearity Correction Flag                               | 0<br>1                     | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | L_LIN_CORR_TBL  | Limb Linearity Correction Table ID                           | N/A                        | N/A                                                                        | U         |
| 544       | 16          | L_FIXED_COADDS  | Limb Fixed Coadd Count                                       | N/A                        | N/A                                                                        | U         |
| 560       | 8           | L_REORDER_IMG   | Limb Reorder Image Flag                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | L_GAIN_CORR     | Limb Gain Correction Flag                                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | L GAIN CORR TBL | Limb Gain Correction Table ID                                | N/A                        | N/A                                                                        | U         |
| 592       | 8           | L1_BIN_IMG      | Limb Profiler Image #1 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | L1_SAMP_TBL     | Limb Profiler Image #1 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 8           | L2_BIN_IMG      | Limb Profiler Image #2 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 624       | 16          | L2_SAMP_TBL     | Limb Profiler Image #2 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 640       | 8           | L_2ND_IMAGE     | Limb Profiler Second Image Flag                              | 0<br>1                     | FALSE<br>TRUE                                                              | U         |
| 648       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number major version                 | N/A                        | N/A                                                                        | U         |
| 656       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number minor version                 | N/A                        | N/A                                                                        | U         |
| 664       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 672       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 680       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 688       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 696       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 704       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| Start Bit         Bit           712         16           728         32           760         16           776         16           792         16           808         16  | Mnemonic Name<br>L2 LAST_IMG_DOY<br>L2 LAST_IMG_MSEC<br>L2 LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD<br>L_T_TELESCOPE | Description<br>Time stamp of last good Limb Image #2 (day of year)<br>Time stamp of last good Limb Image #2<br>Time stamp of last good Limb Image #2<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board | Units<br>OR<br>State Value<br>N/A<br>milliseconds<br>microseconds<br>milliamps<br>Celsius | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name<br>N/A<br>N/A<br>N/A<br>,,, -, 0.005086, 0<br>,,, 0.0484, -273.15                                                                                       | Data Type |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit         Size           712         16           728         32           760         16           776         16           792         16           808         16 | Mnemonic Name L2 LAST_IMG_DOY L2 LAST_IMG_MSEC L2 LAST_IMG_USEC M_I_CAL_LED M_T_MTR_DRV_BD L_T_TELESCOPE                   | Description<br>Time stamp of last good Limb Image #2 (day of year)<br>Time stamp of last good Limb Image #2<br>Time stamp of last good Limb Image #2<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board | OR<br>State Value<br>N/A<br>milliseconds<br>microseconds<br>milliamps<br>Celsius          | OR<br>State Name<br>N/A<br>N/A<br>N/A<br>,, -, -, 0.005086, 0<br>,, -, 0.0484, -273.15                                                                                                                                             | Data Type |
| 712         16           728         32           760         16           776         16           792         16           808         16                                  | L2 LAST_IMG_DOY<br>L2 LAST_IMG_MSEC<br>L2 LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD<br>L_T_TELESCOPE                  | Time stamp of last good Limb Image #2 (day of year)<br>Time stamp of last good Limb Image #2<br>Time stamp of last good Limb Image #2<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                | N/A<br>milliseconds<br>microseconds<br>milliamps<br>Celsius                               | N/A<br>N/A<br>N/A<br>-, -, -, -, -, 0.005086, 0<br>-, -, -, -, 0.0484, -273.15                                                                                                                                                     |           |
| 712         16           728         32           760         16           776         16           792         16           808         16                                  | L2 LAST IMG DOY<br>L2 LAST IMG_MSEC<br>L2 LAST IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD<br>L_T_TELESCOPE                  | Time stamp of last good Limb Image #2 (day of year)<br>Time stamp of last good Limb Image #2<br>Time stamp of last good Limb Image #2<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                | N/A<br>milliseconds<br>microseconds<br>milliamps<br>Celsius                               | N/A<br>N/A<br>N/A<br>-, -, -, -, 0.005086, 0<br>-, -, -, -, 0.0484, -273.15                                                                                                                                                        |           |
| 728         32           760         16           776         16           792         16           808         16                                                           | L2 LAST IMG MSEC<br>L2 LAST IMG USEC<br>M I CAL LED<br>M T MTR DRV BD<br>L_T_TELESCOPE                                     | Time stamp of last good Limb Image #2<br>Time stamp of last good Limb Image #2<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                                       | milliseconds<br>microseconds<br>milliamps<br>Celsius                                      | N/A<br>N/A<br>-, -, -, 0.005086,0<br>-, -, -, 0.0484,-273.15                                                                                                                                                                       | UUS       |
| 760         16           776         16           792         16           808         16                                                                                    | L2_LAST_ING_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD<br>L_T_TELESCOPE                                                         | Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                                                                                                                         | microseconds<br>milliamps<br>Celsius                                                      | -, -, -, 0.005086, 0<br>-, -, -, -, 0.0484, -273.15                                                                                                                                                                                | S         |
| 775         16           792         16           808         16                                                                                                             | M_T_CAL_LED<br>M_T_MTR_DRV_BD                                                                                              | Temperature - Motor Driver Board                                                                                                                                                                                                  | Celsius                                                                                   | -, -, -, 0.005086,0                                                                                                                                                                                                                | 5         |
| 808 16                                                                                                                                                                       | L_T_TELESCOPE                                                                                                              | Temperature - Miotor Driver Board                                                                                                                                                                                                 | Ceisius                                                                                   | -, -, -, -, 0.0404, -273.15                                                                                                                                                                                                        |           |
| 808 16                                                                                                                                                                       | L_T_TELESCOPE                                                                                                              |                                                                                                                                                                                                                                   |                                                                                           | 22769 to 22: 9 460E E 0.02022 1.00 129 9                                                                                                                                                                                           | 3         |
|                                                                                                                                                                              |                                                                                                                            | Temperature - Limb Telescope                                                                                                                                                                                                      | Celsius                                                                                   | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7, 7                                                        | s         |
| 824 16                                                                                                                                                                       | L_T_PRISM_1                                                                                                                | Temperature - Limb Prism #1                                                                                                                                                                                                       | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 840 16                                                                                                                                                                       | L_T_PRISM_2                                                                                                                | Temperature - Limb Prism #2                                                                                                                                                                                                       | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 856 16                                                                                                                                                                       | L_T_CCD                                                                                                                    | Temperature - Limb CCD                                                                                                                                                                                                            | Celsius                                                                                   | -, -, -, -0.0238, 58.05                                                                                                                                                                                                            | S         |
| 872 16                                                                                                                                                                       | M_V_MTR_RES_5V                                                                                                             | Voltage - Motor/Resolver Electronics +5V                                                                                                                                                                                          | Volts                                                                                     | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 888 16                                                                                                                                                                       | M_V_RES_12V                                                                                                                | Voltage - Resolver Electronics +12V                                                                                                                                                                                               | Volts                                                                                     | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 904 16                                                                                                                                                                       | M_V_RES_M12V                                                                                                               | Voltage - Resolver Electronics -12V                                                                                                                                                                                               | Volts                                                                                     | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 920 16                                                                                                                                                                       | L_T_MOTOR                                                                                                                  | Temperature - Limb Diffuser Motor                                                                                                                                                                                                 | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 936 16                                                                                                                                                                       | L_T_HOUSING                                                                                                                | Temperature - Limb Housing                                                                                                                                                                                                        | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 952 16                                                                                                                                                                       | L_T_SUN_SIDE                                                                                                               | Temperature - Limb Sun Side                                                                                                                                                                                                       | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 968 16                                                                                                                                                                       | L_T_DARK_SIDE                                                                                                              | Temperature - Limb Dark Side                                                                                                                                                                                                      | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 984 16                                                                                                                                                                       | L_T_COND_BAR                                                                                                               | Temperature - Limb Conductor Bar                                                                                                                                                                                                  | Celsius                                                                                   | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1000 16                                                                                                                                                                      | L_T_WINDOW                                                                                                                 | Temperature - Limb Window                                                                                                                                                                                                         | Celsius                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1016 16                                                                                                                                                                      | L_P_HTR_SET                                                                                                                | Power Setpoint - Limb CCD Window Heater                                                                                                                                                                                           | Watts                                                                                     | -, -, 5.76E-8,0,0                                                                                                                                                                                                                  | S         |
| 1032 16                                                                                                                                                                      | L_T_SIG_BD                                                                                                                 | Temperature - Nadir Signal Board                                                                                                                                                                                                  | Celsius                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1048 16                                                                                                                                                                      | L_T_TIM_BD                                                                                                                 | Temperature - Nadir Timing Board                                                                                                                                                                                                  | Celsius                                                                                   | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1064 1366784                                                                                                                                                                 | N/A                                                                                                                        | CCD Data (42712 pixels x 32 bits/pixel)                                                                                                                                                                                           | N/A                                                                                       | N/A                                                                                                                                                                                                                                | U         |
| 1367848 8                                                                                                                                                                    | N/A                                                                                                                        | Pad Byte                                                                                                                                                                                                                          | N/A                                                                                       | N/A                                                                                                                                                                                                                                | U         |

#### 4.3.7.7 Diagnostic Limb Profiler Short Exposure

The Diagnostic Limb Profiler Short (L2) Exposure packet is output in APID 579 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. Currently, there is only one sample table for APID 579 and it is identical to the Earth View Limb Profiler Short packet. So APID 579 will be a single group of 106 CCSDS packets with a total of 107628 octets. Figure 4.3-38, Figure 4.3-39, and Figure 4.3-40 below show the packet structure as currently baselined. More generic figures suitable for a different sized packet can be found in the Diagnostic Calibration packet sections. Table 4.3.14 lists the user data fields as if the data were in a single packet.

|      |            |                   | PACKE           | T PRIMARY | HEADER                         |                                                 |                              | SEC                           | CONDARY HEAI                             | DER                                   |                                                        |                                                    |                      | User D                           | ata Field                        |                                 |                                |  |
|------|------------|-------------------|-----------------|-----------|--------------------------------|-------------------------------------------------|------------------------------|-------------------------------|------------------------------------------|---------------------------------------|--------------------------------------------------------|----------------------------------------------------|----------------------|----------------------------------|----------------------------------|---------------------------------|--------------------------------|--|
|      | Verson No. | Packe             | t Identific     | ation     | Packet :                       | Sequence                                        | Packet                       | Start of                      | Packets in                               | Spare                                 |                                                        | OMPS Heade                                         | r                    |                                  | Engineering D                    | Data                            | Science                        |  |
|      |            | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags              | Sequence<br>Count                               | Length                       | Scan                          | RDR<br>- 1                               |                                       | RDR<br>Version                                         | Cont Count<br>-1                                   | Cont Flag            | Eng                              | neering Data S                   | Sections                        | CCD data<br>(start)            |  |
| Bits | 3          | 1                 | 1               | 11        | 2                              | 14                                              | 16                           | 64                            | 8                                        | 8                                     | 16                                                     | 8                                                  | 8                    |                                  | 1032                             |                                 | 7000                           |  |
| ets  |            |                   | 2               |           | :                              | 2                                               | 2                            | 8                             | 1                                        | 1                                     | 2                                                      | 1                                                  | 1                    |                                  | 129                              |                                 | 875                            |  |
| 1    | 000        | <b>N</b> 0        | 1               | 0.040     |                                |                                                 | 0.00-00                      |                               | 0.07                                     |                                       |                                                        |                                                    | maniaa               |                                  | < vorion                         |                                 | varies                         |  |
| arue | 000        | ۲<br>۲            |                 | 0x243     | 01                             | varies                                          | UXU3E9                       | varies                        | 0x2F                                     | varies                                | varies                                                 | varies                                             | Valles               |                                  | Varies                           |                                 | 141100                         |  |
| irne | 000        | Tele              | metry Packet    |           | 01<br>Secondary Hea<br>Present | der                                             | 0x03F9                       | varies                        | Ux2F                                     | varies                                | Varies                                                 | varies                                             | Valles               |                                  | Valles                           |                                 |                                |  |
| iiue | 000        | Tele              | metry Packet    |           | Gecondary Hea<br>Present       | der<br>Sensor_Inf<br>o (7)                      | Mech_SD<br>(59)              | Mech_Limb<br>(63)             | Ux2F<br>Mech_Limb_<br>SD (72)            | Limb_SD<br>(65)                       | Engine<br>Limb_IMG_P<br>rofile_SD<br>(51)              | eering Data            Limb_1st_S           D (49) | Curr_LED_S<br>D (26) | Temp_Mech_<br>SD (30)            | Temp_Limb_<br>SD (29)            | Volt_Mech_SD<br>(42)            | Temp_Limb<br>(25)              |  |
| Ine  | 000        | Tele              | metry Packet    |           | Secondary Hea<br>Present       | der<br>Sensor_Inf<br>o (7)<br>64                | Mech_SD<br>(59)              | Mech_Limb<br>(63)<br>88       | 0x2F<br>Mech_Limb_<br>SD (72)<br>56      | Limb_SD<br>(65)<br>96                 | Engine<br>Limb_IMG_P<br>rofile_SD<br>(51)<br>264       | varies                                             | Curr_LED_S<br>D (26) | Temp_Mech_<br>SD (30)<br>16      | Temp_Limb_<br>SD (29)<br>64      | Volt_Mech_SD<br>(42)<br>48      | Temp_Limb<br>(25)<br>144       |  |
| LUE  | 000        | Tele              | metry Packet    |           | Secondary Hea                  | varies<br>der<br>Sensor_Inf<br>o (7)<br>64<br>8 | Mech_SD<br>(59)<br>112<br>14 | Mech_Limb<br>(63)<br>88<br>11 | 0x2F<br>Mech_Limb_<br>SD (72)<br>56<br>7 | varies<br>Limb_SD<br>(65)<br>96<br>12 | Engine<br>Limb_IMG_P<br>rofile_SD<br>(51)<br>264<br>33 | eering Data<br>Limb_1st_S<br>D (49)<br>64<br>8     | Curr_LED_S<br>D (26) | Temp_Mech_<br>SD (30)<br>16<br>2 | Temp_Limb_<br>SD (29)<br>64<br>8 | Volt_Mech_SD<br>(42)<br>48<br>6 | Temp_Limb<br>(25)<br>144<br>18 |  |

gure 4.3-38 OMPS Diagnostic Limb Profiler Short Exposure First Packet Format

PS D.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

Fi

#### NPP MDFCB

MIDDLE PACKET Qty. 104

|        |              |                   | PACKE           | T PRIMARY | HEADER            |                   |            | User Data Field      |       |                      |
|--------|--------------|-------------------|-----------------|-----------|-------------------|-------------------|------------|----------------------|-------|----------------------|
|        | Verson       | Packe             | t Identifi      | cation    | Packet            | Sequence          | Packet     | Science              |       |                      |
|        | No.          | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length     | CCD data<br>(middle) | TOTAL | TOTAL Middle Packets |
| Bits   | 3            | 1                 | 1               | 11        | 2                 | 14                | 16         | 8144                 | 8192  | 851968               |
| Octets |              |                   | 2               |           |                   | 2                 | 2          | 1018                 | 1024  | 106496               |
| Value  | 000          | 0 /               | 0               | 0x243     | 00 1              | varies            | 0x03F9     | varies               |       |                      |
| Те     | lemetry Pack | et                |                 |           |                   | Midc              | lle Packet | IIII IIII            |       |                      |

# Figure 4.3-39 OMPS Diagnostic Limb Profiler Short Exposure Middle Packet Format

LAST PACKET

|        |               |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field   |          |       |           |
|--------|---------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------|----------|-------|-----------|
|        | Verson No.    | Packe             | t Identific     | cation    | Packet            | Sequence          | Packet | Science           |          |       |           |
|        |               | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | Pad Byte | TOTAL | RDR TOTAL |
| Bits   | 3             | 1                 | 1               | 11        | 2                 | 14                | 16     | 808               | 8        | 864   | 86102     |
| Octets |               |                   | 2               |           |                   | 2                 | 2      | 101               | 1        | 108   | 10762     |
| Value  | 000           | 0 /               | 0               | 0x243     | 10                | varies            | 0x0065 | varies            | fixed    |       |           |
| Te     | lemetry Packe | t                 |                 |           |                   | Last              | Packet |                   |          |       |           |

861024 107628

# Figure 4.3-40 OMPS Diagnostic Limb Profiler Short Exposure Last Packet Format

| Table 4.3.14 OMPS Diagnostic Limb | Profiler Short Exposure Packet User Data Fields |
|-----------------------------------|-------------------------------------------------|
|                                   |                                                 |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | <u> </u>  |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A<br>N/A                 | N/A                                                                                                                    |           |
| 32        | 8           | SENSOR ID        | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A                                                                                                                    | - ŭ       |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | Ū         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0                          | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1 0                        | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0                          | Boot Side 1                                                                                                            | U         |
| 96        | 7           | M MCR SPARE6     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                              | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 104       | 3           | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                             | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                    | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                 | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                     | 1                          | OFF                                                                                                                    | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                         | 0<br>1                     | NOT_BUSY<br>BUSY                                                                                                       | U         |
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                                                       | 0                          | OFF                                                                                                                    | U         |
| 140       | 3           | M THCR SPARE5    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    | U         |
| 143       | 1           | M NP TEC STATE   | State of the NP TEC Control                                                       | 0                          | OFF                                                                                                                    | U         |
| 144       | 3           | M THCR SPARE4    | Unused hits of the TEC & Heater Control & Status Register                         | 1<br>N/A                   | ON                                                                                                                     |           |
| 447       |             |                  | Onded bits of the FEO & realer Control & Otatus Register                          | 0                          | OFF                                                                                                                    |           |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                                                       | 1                          | ON                                                                                                                     | 0         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                         | N/A                        | N/A                                                                                                                    |           |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                         | 1                          | ON                                                                                                                     | U         |
|           |             | TR               |                                                                                   |                            |                                                                                                                        |           |

| Table 4.3.14 | OMPS Diagnostic | <b>Limb Profiler Short</b> | Exposure Packet | User Data Fields (cont) |
|--------------|-----------------|----------------------------|-----------------|-------------------------|
|--------------|-----------------|----------------------------|-----------------|-------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 1                          | OFF                                                                        | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0                          | NADIR<br>LIMB                                                              | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              |           |

| Table 4.3.14 | <b>OMPS</b> Diagnostic | Limb Profiler Shor | t Exposure Packe | t User Data Fields ( | cont) |
|--------------|------------------------|--------------------|------------------|----------------------|-------|
|--------------|------------------------|--------------------|------------------|----------------------|-------|

|           |             |                  |                                                               |                            | A                                                                          |           |
|-----------|-------------|------------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_L_RESOLV_BUSY  | Limb Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M_L_RESOLV_SPARE | Limb Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_L_RESOLV_DATA  | Limb Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |
| 240       | 7           | M_LMP_SPARE4     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_L_DIRECTION    | Limb Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_LMP_SPARE3     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_L_SPEED        | Limb Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_LMP_SPARE2     | Limb Motor Parameter Register - Unused Bits                   | 0<br>1                     | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_L_PHASE        | Limb Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLOS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_LMP_SPARE1     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_L_STEP_COUNT   | Limb Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_L_RETRIES      | Limb Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_L_DESTINATION  | Limb Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_LP_TEC_SETPT   | Commanded LP TEC Setpoint                                     | N/A                        | N/A                                                                        | U         |
| 312       | 16          | M_LP_HTR_SETPT   | Commanded LP CCD Window Heater Setpoint                       | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_L_POSITION     | Limb Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 344       | 8           | M_L_POS_ID       | Limb Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 352       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 360       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 368       | 16          | L_ROWS           | Rows of Limb Profiler CCD data                                | N/A                        | N/A                                                                        | U         |
| 384       | 16          | L_COLS           | Columns of Limb Profiler CCD data                             | N/A                        | N/A                                                                        | U         |
| 400       | 16          | L_IMG_STATUS     | Limb Image Processing Status Word                             | N/A                        | N/A                                                                        | U         |
| 416       | 32          | L_INT_HOLD_TIME  | Limb TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             | - MA             |                                                               |                            |                                                                            |           |

| Table 4.3.14 O | MPS Diagnostic | Limb Profiler Sho | rt Exposure Pac | ket User Data Field | s (cont) |
|----------------|----------------|-------------------|-----------------|---------------------|----------|
|----------------|----------------|-------------------|-----------------|---------------------|----------|

| Start Bit | Bit<br>Size | Mnemonic Name   | Description                                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|-----------------|--------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | L PROFILE ID    | Active Limb Profile ID                                       | N/A                        | N/A                                                                        | U         |
| 456       | 8           | L PROFILE VER   | Limb Imaging Profile Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 464       | 8           | L_PROFILE_VER   | Limb Imaging Profile Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 472       | 16          | L_TIM_PAT_TBL   | Limb Timing Pattern Table ID                                 | N/A                        | N/A                                                                        | U         |
| 488       | 16          | L1_APID         | Limb Profiler Image #1 Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | L2_APID         | Limb Profiler Image #2 Application ID                        | N/A                        | N/A                                                                        | U         |
| 520       | 8           | L_LIN_CORR      | Limb Linearity Correction Flag                               | 0<br>1                     | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | L LIN CORR TBL  | Limb Linearity Correction Table ID                           | N/A                        | N/A                                                                        | U         |
| 544       | 16          | L FIXED COADDS  | Limb Fixed Coadd Count                                       | N/A                        | N/A                                                                        | U         |
| 560       | 8           | L_REORDER_IMG   | Limb Reorder Image Flag                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | L_GAIN_CORR     | Limb Gain Correction Flag                                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | L GAIN CORR TBL | Limb Gain Correction Table ID                                | N/A                        | N/A                                                                        | U         |
| 592       | 8           | L1_BIN_IMG      | Limb Profiler Image #1 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | L1_SAMP_TBL     | Limb Profiler Image #1 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 8           | L2_BIN_IMG      | Limb Profiler Image #2 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 624       | 16          | L2_SAMP_TBL     | Limb Profiler Image #2 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 640       | 8           | L_2ND_IMAGE     | Limb Profiler Second Image Flag                              | 0<br>1                     | FALSE<br>TRUE                                                              | U         |
| 648       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number major version                 | N/A                        | N/A                                                                        | U         |
| 656       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number minor version                 | N/A                        | N/A                                                                        | U         |
| 664       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 672       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 680       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 688       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 696       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 704       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |

| Table 4.3.14 | OMPS Diagnostic L | _imb Profiler Short Expos | ure Packet User Data | Fields (cont) |
|--------------|-------------------|---------------------------|----------------------|---------------|
|              | onn o Blagnoodo i |                           |                      |               |

| Mnemonic Name                                                                                             | Description<br>Time stamp of last good Limb Image #1 (day of year)<br>Time stamp of last good Limb Image #1<br>Time stamp of last good Limb Image #1<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                    | Units<br>OR<br>State Value<br>N/A<br>milliseconds<br>microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>O 0,005086_0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Data Type                                                                            |
|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Mnemonic Name<br>L1 LAST_IMG_DOY<br>L1 LAST_IMG_MSEC<br>L1 LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD | Description Time stamp of last good Limb Image #1 (day of year) Time stamp of last good Limb Image #1 Time stamp of last good Limb Image #1 Current in the active Calibration LED Temperature - Motor Driver Board                                                   | OR<br>State Value<br>N/A<br>milliseconds<br>microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | OR<br>State Name<br>N/A<br>N/A<br>N/A<br>N/A<br>0.005086 0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Data Type                                                                            |
| L1 LAST_IMG_DOY<br>L1_LAST_IMG_MSEC<br>L1_LAST_IMG_USEC<br>M_CAL_LED<br>M_T_MTR_DRV_BD                    | Time stamp of last good Limb Image #1 (day of year)<br>Time stamp of last good Limb Image #1<br>Time stamp of last good Limb Image #1<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                   | State Value<br>N/A<br>milliseconds<br>microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | State Name<br>N/A<br>N/A<br>N/A<br>N/A<br>0.005086.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | U<br>U<br>U                                                                          |
| L1 LAST_IMG_DOY<br>L1_LAST_IMG_MSEC<br>L1_LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD                  | Time stamp of last good Limb Image #1 (day of year)<br>Time stamp of last good Limb Image #1<br>Time stamp of last good Limb Image #1<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                   | N/A<br>milliseconds<br>microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | N/A<br>N/A<br>N/A<br>0.005086.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                      |
| L1_LAST_IMG_MSEC<br>L1_LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD                                     | Time stamp of last good Limb Image #1<br>Time stamp of last good Limb Image #1<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                                                                          | milliseconds<br>microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A<br>N/A<br>0.005086.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | U                                                                                    |
| L1_LAST_IMG_USEC<br>M_I_CAL_LED<br>M_T_MTR_DRV_BD                                                         | Time stamp of last good Limb Image #1<br>Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                                                                                                                   | microseconds<br>milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | U U                                                                                  |
| M_I_CAL_LED<br>M_T_MTR_DRV_BD                                                                             | Current in the active Calibration LED<br>Temperature - Motor Driver Board                                                                                                                                                                                            | milliamps                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.005086.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0                                                                                    |
| M_T_MTR_DRV_BD                                                                                            | Temperature - Motor Driver Board                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | S                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -, -, -, 0.0484, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | S                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| I T TELESCOPE                                                                                             | Temperature - Limb Telescope                                                                                                                                                                                                                                         | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | s                                                                                    |
| L_1_122200012                                                                                             |                                                                                                                                                                                                                                                                      | Colordo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Ũ                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L T PRISM 1                                                                                               | Temperature - Limb Prism #1                                                                                                                                                                                                                                          | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | s                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1/96 to 32/6/: -, -, -9.53E-11, 1.81/E-6, -0.01566, /./                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L T PRISM 2                                                                                               | Temperature - Limb Prism #2                                                                                                                                                                                                                                          | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | S                                                                                    |
|                                                                                                           | ·                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 344 to 1/95: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           | Temperature Limb CCD                                                                                                                                                                                                                                                 | Calaius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 1/96 t0 32/67: -, -, -9.53E-11, 1.81/E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           | Voltare Meter/Baselver Electronice + 5V                                                                                                                                                                                                                              | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -, -, -, -, -0.0230, 50.05                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                      |
|                                                                                                           | Voltage - Motol/Resolver Electronics +3V                                                                                                                                                                                                                             | Volts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -, -, -, 0.00311,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                      |
| M V RES M12V                                                                                              | Voltage - Resolver Electronics -12V                                                                                                                                                                                                                                  | Volts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -, -, -, 0.00311.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                      |
| M_V_NEO_M12V                                                                                              | Voltage - Nesolver Electionics - 12 V                                                                                                                                                                                                                                | Volta                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -32768 to 83' 8 469E-5 . 0 020331 99 .128 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 84 to 343'                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                      |
| L_T_MOTOR                                                                                                 | Temperature - Limb Diffuser Motor                                                                                                                                                                                                                                    | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795; 1 044E-8 4 681E-5 _0 08272 43 02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | S                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83:8.469E-5. 0.020331.99. 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 84 to 3431 465F-6 0 001323 -0 4741 86 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                      |
| L_T_HOUSING                                                                                               | Temperature - Limb Housing                                                                                                                                                                                                                                           | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795:1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | S                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767:9.53E-11. 1.817E-60.01566. 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      | <u> </u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L_I_SUN_SIDE                                                                                              | Temperature - Limb Sun Side                                                                                                                                                                                                                                          | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | S                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L T DARK SIDE                                                                                             | Tomporatura Limb Dark Sida                                                                                                                                                                                                                                           | Coloiun                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L_I_DARK_SIDE                                                                                             | Temperature - Linto Dark Side                                                                                                                                                                                                                                        | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 3                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                      |
| L T COND BAR                                                                                              | Temperature - Limb Conductor Bar                                                                                                                                                                                                                                     | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 9                                                                                    |
| L_T_COND_DAR                                                                                              | remperature - Eimb Conductor bar                                                                                                                                                                                                                                     | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 5                                                                                    |
|                                                                                                           |                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                      |
| L_T_WINDOW                                                                                                | Temperature - Limb Window                                                                                                                                                                                                                                            | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | S                                                                                    |
| L_P_HTR_SET                                                                                               | Power Setpoint - Limb CCD Window Heater                                                                                                                                                                                                                              | Watts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | -, -, 5.76E-8,0,0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | S                                                                                    |
| L_T_SIG_BD                                                                                                | Temperature - Nadir Signal Board                                                                                                                                                                                                                                     | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | S                                                                                    |
| L_T_TIM_BD                                                                                                | Temperature - Nadir Timing Board                                                                                                                                                                                                                                     | Celsius                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | -, -, -, 0.0486, -273.15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | S                                                                                    |
| N/A                                                                                                       | CCD Data (26712 pixels x 32 bits/pixel)                                                                                                                                                                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | U                                                                                    |
| N/A                                                                                                       | Pad Byte                                                                                                                                                                                                                                                             | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | U                                                                                    |
|                                                                                                           | L_T_PRISM_2<br>L_T_CCD<br>M_V_MTR_RES_5V<br>M_V_RES_12V<br>M_V_RES_M12V<br>L_T_MOTOR<br>L_T_MOTOR<br>L_T_HOUSING<br>L_T_SUN_SIDE<br>L_T_DARK_SIDE<br>L_T_COND_BAR<br>L_T_WINDOW<br>L_P_HTR_SET<br>L_T_SIG_BD<br>L_T_SIG_BD<br>L_T_SIG_BD<br>L_T_SIG_BD<br>N/A<br>N/A | L_T_PRISM_2     Temperature - Limb Prism #2       L_T_COD     Temperature - Limb CCD       M_V_MTR_RES_5V     Voltage - Motor/Resolver Electronics +5V       M_V_RES_M12V     Voltage - Resolver Electronics +12V       M_V_RES_M12V     Voltage - Resolver Electronics +12V       L_T_MOTOR     Temperature - Limb Diffuser Motor       L_T_MOTOR     Temperature - Limb Diffuser Motor       L_T_HOUSING     Temperature - Limb Bounside       L_T_SUN_SIDE     Temperature - Limb Dark Side       L_T_DARK_SIDE     Temperature - Limb Dark Side       L_T_COND_BAR     Temperature - Limb Conductor Bar       L_T_WINDOW     Temperature - Limb Conductor Bar       L_T_SIG_BD     Temperature - Limb COD Window Heater       L_T_NE_SIDE     Temperature - Nadir Signal Board       L_T_NIN_DD     Temperature - Nadir Signal Board       L_T_NIN_DD     Temperature - Nadir Signal Board       N/A     Pad Byte | L_T_PRISM_2     Temperature - Limb Prism #2     Celsius       L_T_CD     Temperature - Limb CCD     Celsius       M_V_MTR_RES_5V     Voltage - Resolver Electronics +5V     Voltag       M_V_RES_12V     Voltage - Resolver Electronics +12V     Voltag       M_V_RES_M12V     Voltage - Resolver Electronics +12V     Voltag       L_T_MOTOR     Temperature - Limb Diffuser Motor     Celsius       L_T_HOUSING     Temperature - Limb Diffuser Motor     Celsius       L_T_SUN_SIDE     Temperature - Limb Bun Side     Celsius       L_T_OARK_SIDE     Temperature - Limb Dark Side     Celsius       L_T_COND_BAR     Temperature - Limb Conductor Bar     Celsius       L_T_SIDE     Temperature - Limb COM Wetater     Watts       L_T_GOND_BAR     Temperature - Limb COM Wetater     Celsius       L_T_SIDE     Temperature - Limb Conductor Bar     Celsius       L_T_SIDE     Temperature - Limb COM Wetater     Watts       L_T_COND_BAR     Temperature - Limb Conductor Bar     Celsius       L_T_SIDE     Temperature - Limb Conductor Bar     Celsius       L_T_SIDE     Temperature - Limb Window     Celsius       L_T_NOOW     Temperature - Limb Window     Celsius       L_T_NA     CCD Data (26712 pixels x 32 bits/pixel)     N/A       N/A     CCD Data (26712 pixels x 32 bits/pixe | L_T_PRISM_2         Temperature - Limb Prism #2         Gelsus         3.2768 to 83: |

#### 4.3.7.8 Diagnostic Nadir Total Column Calibration

The Diagnostic Nadir Total Column Calibration packet is output in APID 580 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. If all the CCD pixels are sent unbinned, five grouped APID 580 packets are required. Each of the five packets is a grouped packet. Only the first of the five grouped packets contains the engineering data. The first CCSDS packet of each of the five groups contains a secondary header and the OMPS header.

Because the size of APID 580 is configurable, Figure 4.3-41 to Figure 4.3-45 below show the packet structure of a standalone diagnostic packet, the first packet of the first grouped packet, the middle and last of the grouped packets and the first packet of any but the first group of packets. These figures give a good indication of the structure but are not meant to be a comprehensive presentation of every configuration of the multiple grouped packets. Table 4.3.15 lists the user data fields as if multiple groups of packets were unnecessary.



Figure 4.3-41 OMPS Ungrouped Diagnostic Nadir Total Column Calibration Packet Format

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

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FIRST PACKET

|        |            |                   | PACKE           | T PRIMARY | HEADER                  |                     |                 | SE                 | CONDARY HEA            | DER              |                                 |                        |                      | User D                | Data Field             |                      |                    |                     |                 |
|--------|------------|-------------------|-----------------|-----------|-------------------------|---------------------|-----------------|--------------------|------------------------|------------------|---------------------------------|------------------------|----------------------|-----------------------|------------------------|----------------------|--------------------|---------------------|-----------------|
|        | Verson No. | . Packe           | t Identific     | cation    | Packet                  | Sequence            | Packet          | Start of           | Packets in             | Spare            |                                 | OMPS Heade             | r                    | E                     | ngineering             | Data                 | Scie               | ence                |                 |
|        |            | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags       | Sequence<br>Count   | Length          | Scan               | RDR<br>- 1             |                  | RDR<br>Version                  | Cont Count<br>-1       | Cont Flag            | Engine                | eering Data            | Sections             | HW Start<br>Tag    | CCD data<br>(start) | TOTAL           |
| Bits   | 3          | 1                 | 1               | 11        | 2                       | 14                  | 16              | 64                 | 8                      | 8                | 16                              | 8                      | 8                    |                       | 1208                   |                      | 32                 | 6792                | 8192            |
| Octets |            |                   | 2               |           |                         | 2                   | 2               | 8                  | 1                      | 1                | 2                               | 1                      | 1                    |                       | 151                    |                      | 4                  | 849                 | 1024            |
| Value  | 000        | , 0               | 1               | 0x244     | 01                      | varies              | 0x03F9          | varies             | varies                 | 0x00             | varies                          | varies                 | varies               |                       | varies                 |                      | varies             | varies              |                 |
|        |            | Telen             | netry Packet    | Hea       | condary<br>ader Present |                     |                 |                    |                        |                  |                                 | Engine                 | ering Data           |                       | Q,                     |                      |                    |                     |                 |
|        |            |                   |                 |           |                         | Sensor_Inf<br>o (7) | Mech_SD<br>(59) | Mech_Nadir<br>(62) | Mech_Nadir<br>_SD (73) | Nadir_SD<br>(71) | Nadir_IMG<br>Profile_SI<br>(50) | Nadir_TC_S<br>D D (66) | Curr_LED_S<br>D (26) | Temp_Mech_<br>SD (30) | Temp_Nadir<br>_SD (28) | Volt_Mech_SD<br>(42) | Temp_Nadir<br>(24) | Temp_NP<br>(36)     | Temp_TC<br>(35) |
|        |            |                   |                 |           |                         | 64                  | 112             | 88                 | 88                     | 64               | 360                             | 96                     | 16                   | 16                    | 48                     | 48                   | 176                | 16                  | 16              |
|        |            |                   |                 |           |                         | 8                   | 14              | 11                 | 11                     | 8                | 45                              | 12                     | 2                    | 2                     | 6                      | 6                    | 22                 | 2                   | 2               |
|        |            |                   |                 |           |                         | varies              | varies          | varies             | varies                 | varies           | varies                          | zeros                  | varies               | varies                | varies                 | varies               | varies             | varies              | varies          |
|        |            |                   |                 |           |                         |                     |                 |                    |                        |                  |                                 |                        |                      |                       |                        |                      |                    |                     |                 |

Figure 4.3-42 OMPS First Grouped Diagnostic Nadir Total Column Calibration First Packet Format

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MIDDLE PACKET

| ]      |             |                   | PACKE           | T PRIMARY | HEADER            |                   |           | User Data Field      |      |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|-----------|----------------------|------|
|        | Verson      | Packe             | t Identifi      | cation    | Packet            | Sequence          | Packet    | Science              |      |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length    | CCD data<br>(middle) | тота |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16        | 8144                 | 8192 |
| Octets |             |                   | 2               |           |                   | 2                 | 2         | 1018                 | 1024 |
| Value  | 000         | 0 /               | 0               | 0x244     | 00 1              | varies            | 0x03F9    | varies               |      |
| Tel    | emetry Pack | et                |                 |           | Ĺ                 | Midd              | le Packet | - ROLLIN             | _    |

# Figure 4.3-43 OMPS Grouped Diagnostic Nadir Total Column Calibration Middle Packet Format

de la

|        |             |                   | PACKE           | T PRIMARY | HEADER            |                   |        | User Data Field   |               |          |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------|---------------|----------|
|        | Verson      | Packet            | : Identifi      | cation    | Packet            | Sequence          | Packet | Science           |               |          |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | HW End<br>Tag | Pad Byte |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16     | varies            | 32            | 8        |
| Octets |             | 2                 | 2               |           |                   | 2                 | 2      | varies            | 4             | 1        |
| Value  | 000         | 0 /               | 0               | 0x244     | 10                | varies            | varies | varies            | varies        | varies   |
| Tel    | emetry Pack | et                |                 |           |                   | Last              | Packet |                   |               |          |



FIRST PACKET of a group, but not of the first group

|       |        |           | PACKE        | T PRIMARY | HEADER                     |          |        | SEC      | CONDARY HEA | DER   |         | Us          | ser Data Fie | eld      |       |
|-------|--------|-----------|--------------|-----------|----------------------------|----------|--------|----------|-------------|-------|---------|-------------|--------------|----------|-------|
|       | Verson | Packet    | t Identifi   | cation    | Packet                     | Sequence | Packet | Start of | Packets     | Spare |         | OMPS Heade  | r            | Science  |       |
|       | No.    | Type      | Sec Hdr      | APID      | Sequence                   | Sequence | Length | Scan     | in RDR      |       | RDR     | Cont        | Cont Flag    | CCD data |       |
|       |        | Indicator | Flag         |           | Flags                      | Count    |        |          | - 1         |       | Version | Count<br>-1 |              | (middle) | TOTAL |
| Bits  | 3      | 1         | 1            | 11        | 2                          | 14       | 16     | 64       | 8           | 8     | 16      | 8           | 8            | 8032     | 8192  |
| ctets |        | 4         | 2            |           |                            | 2        | 2      | 8        | 1           | 1     | 2       | 1           | 1            | 1004     | 1024  |
| Value | 000    | , 0       | 1            | 0x244     | 01                         | varies   | 0x03F9 | varies   | varies      | 0x00  | varies  | varies      | varies       | varies   |       |
| _     |        | Telem     | netry Packet |           | Secondary<br>leader Preser | ıt       |        |          |             | ·     |         |             |              |          | _     |



| Table 4.3.15 OMPS Diagnostic Nadir Total Column Calibration Packet User Data | Fields |
|------------------------------------------------------------------------------|--------|
|------------------------------------------------------------------------------|--------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                                                           | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                                                  | N/A                        | N/A                                                                                                                    | U         |
| 24        | 8           | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR<br>OMPS Sensor Identification (not for Dwell or FSW Rootup status) | N/A<br>N/A                 | N/A                                                                                                                    |           |
| 40        | 8           | FSW VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version                               | N/A                        | N/A                                                                                                                    |           |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version                               | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                                                      | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)                                           | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                                                            | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)                                      | 0-1                        | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)                                        | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                             | 0                          | UNPROTECTED                                                                                                            | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                               | 0                          | 0FF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                                                        | 0<br>1                     | Boot Side 1<br>Boot Side 2                                                                                             | U         |
| 96        | 7           | M_MCR_SPARE6     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                                                            | 0                          | OFF                                                                                                                    | U         |
| 104       | 3           | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                                                           | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                                                  | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                                                   | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                                                       | 0<br>1                     | BUSY                                                                                                                   | U         |
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                                                                                     | 0                          | OFF<br>ON                                                                                                              | U         |
| 140       | 3           | M_THCR_SPARE5    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A<br>OEE                                                                                                             | U         |
| 143       | 1           | M_NP_TEC_STATE   | State of the NP TEC Control                                                                                     | 1                          | OFF                                                                                                                    | U         |
| 144       | 3           | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                                                                                     | 0<br>1                     | 0FF<br>ON                                                                                                              | U         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                                                       | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
|           |             | DR.              |                                                                                                                 |                            |                                                                                                                        |           |

| Table 4.3.15 OMPS Diagnostic Nadir Total Column Calibration Packet User Data Fields (conf | t) |
|-------------------------------------------------------------------------------------------|----|
|-------------------------------------------------------------------------------------------|----|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 1                          | OFF                                                                        | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0                          | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0                          | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0<br>1                     | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              | U         |
|           |             |                  |                                                           |                            |                                                                            |           |

| Table 4.3.15 OMPS Diagnostic Nadir Total Column Calibration Packet User Da | ata Fields (cont) |
|----------------------------------------------------------------------------|-------------------|
|----------------------------------------------------------------------------|-------------------|

|           |             |                  |                                                                |                            | A                                                                          |           |
|-----------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0                          | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M N RESOLV SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | U         |
| 240       | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 247       | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 0                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0 1                        | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_N_DESTINATION  | Nadir Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_TC_TEC_SETPT   | Commanded TC TEC Setpoint                                      | N/A                        | N/A                                                                        | U         |
| 312       | 16          | M_TC_HTR_SETPT   | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_NP_TEC_SETPT   | Commanded NP TEC Setpoint                                      | N/A                        | N/A                                                                        | U         |
| 344       | 16          | M_NP_HTR_SETPT   | Commanded NP CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | U         |
| 360       | 16          | M_N_POSITION     | Nadir Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 376       | 8           | M_N_POS_ID       | Nadir Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 384       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 392       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 400       | 16          | N_IMG_STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                        | U         |
|           |             |                  | H CHOITON                                                      |                            |                                                                            |           |
|           |             |                  |                                                                |                            |                                                                            |           |

| Table 4.3.15 OMPS Diagnostic | <b>Nadir Total Column</b> | <b>Calibration Packet Use</b> | r Data Fields (cont) |
|------------------------------|---------------------------|-------------------------------|----------------------|
|------------------------------|---------------------------|-------------------------------|----------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | N_PROFILE_ID     | Active Nadir Profile ID                                  | N/A                        | N/A                                                                        | U         |
| 456       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 464       | 8           | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 472       | 16          | N_TIM_PAT_TBL    | Nadir Timing Pattern Table ID                            | N/A                        | N/A                                                                        | U         |
| 488       | 16          |                  | Nadir Total Column Application ID                        | N/A                        | N/A                                                                        | <u> </u>  |
| 504       | 10          | NF_AFID          |                                                          | N/A                        |                                                                            | 0         |
| 520       | 8           | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 1                          | ENABLED                                                                    | U         |
| 528       | 16          | TC_LIN_CORR_TBL  | Nadir Total Column Linearity Correction Table ID         | N/A                        | N/A                                                                        | U         |
| 544       | 16          | TC_FIXED_COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A                        | N/A                                                                        | U         |
| 560       | 8           | TC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | TC_GAIN_CORR     | Nadir Total Column Gain Correction Flag                  | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | TC_GAIN_CORR_TBL | Nadir Total Column Gain Correction Table ID              | N/A                        | N/A                                                                        | U         |
| 592       | 8           | TC_BIN_IMG       | Nadir Total Column Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | TC SAMP TBL      | Nadir Total Column Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 0           |                  | Nadir Brofiler Linearity Correction Flog                 | 0                          | DISABLED                                                                   |           |
| 010       | 0           | NP_LIN_CORR      | Nadii Promer Linearity Conection Flag                    | 1                          | ENABLED                                                                    | U         |
| 624       | 16          | NP_LIN_CORR_TBL  | Nadir Profiler Linearity Correction Table ID             | N/A                        | N/A                                                                        | U         |
| 640       | 16          | NP_FIXED_COADDS  | Nadir Profiler Fixed Coadd Count                         | N/A                        | N/A                                                                        | U         |
| 656       | 8           | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 0                          | ENABLED                                                                    | U         |
| 664       | 8           | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 672       | 16          | NP GAIN CORR TBL | Nadir Profilier Gain Correction Table ID                 | N/A                        | N/A                                                                        | U         |
| 688       | 8           | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 0                          | DISABLED                                                                   | U         |
| 696       | 16          | NP SAMP TRI      | Nadir Profilier Sample Table ID                          | N/A                        |                                                                            |           |
| 712       | 8           | TC GAIN TBL VER  | Nadir Total Column Gain Table Version major version      | N/A                        | N/A                                                                        | - U       |
| 720       | 8           | TC GAIN TBL VER  | Nadir Total Column Gain Table Version minor version      | N/A                        | N/A                                                                        | Ŭ         |
| 728       | 8           | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A                        | N/A                                                                        | U         |
| 736       | 8           | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version minor version          | N/A                        | N/A                                                                        | U         |
| 744       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A                        | N/A                                                                        | U         |
| 752       | 8           | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version minor version | N/A                        | N/A                                                                        | U         |
| 760       | 8           | NP_LIN_IBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A                        | N/A                                                                        | U         |
| 768       | 8           | NP_LIN_IBL_VER   | Nadir Profiler Linearity Table Version minor version     | N/A                        | N/A                                                                        | 0         |
| 784       | 8           | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A                        | N/A<br>N/A                                                                 | 0         |
| 792       | 8           | NP SAMP TBL VER  | Nadir Profiler Sample Table Version major version        | N/A                        | N/A                                                                        | - U       |
| 800       | 8           | NP SAMP TBL VER  | Nadir Profiler Sample Table Version minor version        | N/A                        | N/A                                                                        | Ū         |
|           |             | pB.              |                                                          |                            |                                                                            |           |

| Table 4.3.15 OMPS Diagnostic Nadir | Total Column Calibration Page | cket User Data Fields (cont) |
|------------------------------------|-------------------------------|------------------------------|
|                                    |                               |                              |

|           |             |                |                                                |                            | A.                                                                                                                                                                                                                                 |           |
|-----------|-------------|----------------|------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name  | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                         | Data Type |
| 808       | 16          | TC ROWS        | Rows of Nadir Total Column CCD data            | N/A                        | N/A                                                                                                                                                                                                                                | U         |
| 824       | 16          | TC COLS        | Columns of Nadir Total Column CCD data         | N/A                        | N/A                                                                                                                                                                                                                                | - ŭ       |
| 840       | 16          |                | Time stamp of last good TC image (day of year) | N/A                        |                                                                                                                                                                                                                                    | <u> </u>  |
| 856       | 32          |                | Time stamp of last good TC image               | millisoconds               | N/A                                                                                                                                                                                                                                |           |
| 000       | 16          |                |                                                | microscoopde               |                                                                                                                                                                                                                                    | 0         |
| 000       | 10          |                | Current in the patient Collection LED          | millionene                 | N/A 0.005000 0                                                                                                                                                                                                                     | 0         |
| 904       | 16          |                | Current in the active Calibration LED          | miniamps                   |                                                                                                                                                                                                                                    | 5         |
| 920       | 16          | M_I_MIR_DRV_BD | Temperature - Motor Driver Board               | Celsius                    | -, -, -, 0.0484, -273.15                                                                                                                                                                                                           | 5         |
| 936       | 16          | N_T_TELESCOPE  | Temperature - Nadir Telescope                  | Celsius                    | -32/68 to 83: -, -, 8469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7   | S         |
| 952       | 16          | TC_T_CCD       | Temperature - Nadir Total Column CCD           | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 968       | 16          | NP_T_CCD       | Temperature - Nadir Profiler CCD               | Celsius                    | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                         | S         |
| 984       | 16          | M V MTR RES 5V | Voltage - Motor/Resolver Electronics +5V       | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1000      | 16          | M V RES 12V    | Voltage - Resolver Electronics +12V            | Volts                      | -, -, -, 0.00311,0                                                                                                                                                                                                                 | S         |
| 1016      | 16          | M V RES M12V   | Voltage - Resolver Electronics -12V            | Volts                      | 0.00311.0                                                                                                                                                                                                                          | S         |
| 1032      | 16          | N_T_MOTOR      | Temperature - Nadir Diffuser Motor             | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.58E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1048      | 16          | N_T_HOUSING    | Temperature - Nadir Calibration Housing        | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1064      | 16          | N_T_SUN_SIDE   | Temperature - Nadir Sun Side                   | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 1080      | 16          | N_T_DARK_SIDE  | Temperature - Nadir Dark Side                  | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 1096      | 16          | TC_T_COND_BAR  | Temperature - TC Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | S         |
| 1112      | 16          | NP_T_COND_BAR  | Temperature - NP Conductor Bar                 | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1128      | 16          | TC_P_HTR_SET   | Power Setpoint - TC Window Heater              | Watts                      | -, -, 5.76E-8,0,0                                                                                                                                                                                                                  |           |
| 1144      | 16          | NP_P_HTR_SET   | Power Setpoint - NP Window Heater              | Watts                      | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                | S         |
| 1160      | 16          | N T SIG BD     | Temperature - Nadir Signal Board               | Celsius                    | -, -, -, 0.1233, -273.15                                                                                                                                                                                                           | S         |
| 1176      | 16          | N T TIM BD     | Temperature - Nadir Timing Board               | Celsius                    | 0 0486 -273 15                                                                                                                                                                                                                     | s         |
| 1192      | 16          | TC_T_HOUSING   | Temperature - TC Housing.                      | Celsius                    | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7 | s         |
| 1208      | 16          | NP_T_WINDOW    | Temperature - NP Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1224      | 16          | TC T WINDOW    | Temperature - TC Window                        | Celsius                    | -, -, -, 0.0486, -273.15                                                                                                                                                                                                           | S         |
| 1240      | 32          | N/A            | HW Start Tag (if image is not sampled)         | N/A                        | N/A                                                                                                                                                                                                                                | Ū         |
| 1272      | varies      | N/A            | CCD Data (# nixels x 32 hits/nixel)            | N/A                        | N/A                                                                                                                                                                                                                                | - ŭ       |
| Variae    | 32          | N/A            | HW End Tag (if image is not sampled)           | N/A                        | Ν/Δ                                                                                                                                                                                                                                | - ŭ       |
| varios    | 92<br>0     | N/A            |                                                | N/A                        | N/A                                                                                                                                                                                                                                |           |
|           | Ŭ           |                | · ••• 5/10                                     |                            |                                                                                                                                                                                                                                    |           |
|           |             | - Ale          |                                                |                            |                                                                                                                                                                                                                                    |           |

#### 4.3.7.9 Diagnostic Nadir Profiler Calibration

The Diagnostic Nadir Profiler Calibration packet is output in APID 581 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. If all the CCD pixels are sent unbinned, five grouped APID 581 packets are required. Each of the five packets is a grouped packet. Only the first of the five grouped packets contains the engineering data. The first CCSDS packet of each of the five groups contains a secondary header and the OMPS header.

Because the size of APID 581 is configurable, Figure 4.3-46 to Figure 4.3-50 below show the packet structure of a standalone diagnostic packet, the first packet of the first grouped packet, the middle and last of the grouped packets and the first packet of any but the first group of packets. These figures give a good indication of the structure but are not meant to be a comprehensive presentation of every configuration of the multiple grouped packets. Table 4.3.16 lists the user data fields as if multiple groups of packets were unnecessary.



# Figure 4.3-46 OMPS Ungrouped Diagnostic Nadir Profiler Calibration Packet Format

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

BATTOHOL

FIRST PACKET

|        |            |                   | PACKE           | T PRIMARY | HEADER                      |                   |                    | SEC                    | CONDARY HEA      | .DER                             |                      |                      |                        | User D                 | ata Field             |                    |                 |                     |       |
|--------|------------|-------------------|-----------------|-----------|-----------------------------|-------------------|--------------------|------------------------|------------------|----------------------------------|----------------------|----------------------|------------------------|------------------------|-----------------------|--------------------|-----------------|---------------------|-------|
|        | Verson No. | Packe             | t Identific     | cation    | Packet :                    | Sequence          | Packet             | Start of               | Packets in       | Spare                            |                      | OMPS Heade           | r                      | E                      | ngineering            | Data               | Scie            | ence                | 1     |
|        |            | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags           | Sequence<br>Count | Length             | Scan                   | RDR<br>- 1       |                                  | RDR<br>Version       | Cont Count<br>-1     | Cont Flag              | Engine                 | ering Data            | Sections           | HW Start<br>Tag | CCD data<br>(start) | TOTAL |
| Bits   | 3          | 1                 | 1               | 11        | 2                           | 14                | 16                 | 64                     | 8                | 8                                | 16                   | 8                    | 8                      |                        | 1208                  | 2                  | 32              | 6792                | 8192  |
| Octets |            |                   | 2               |           |                             | 2                 | 2                  | 8                      | 1                | 1                                | 2                    | 1                    | 1                      | 4                      | 151                   |                    | 4               | 849                 | 1024  |
| Value  | 000        | <b>\</b> 0        | 1               | 0x245     | 01                          | varies            | 0x03F9             | varies                 | varies           | 0x0                              | varies               | varies               | varies                 |                        | <pre>varies</pre>     |                    | varies          | varies              |       |
|        |            | Telem             | netry Packet    |           | Secondary<br>Header Present |                   |                    |                        |                  |                                  | Engine               | ering Datæ           |                        |                        |                       |                    |                 |                     |       |
|        |            |                   |                 |           | Sensor_Inf<br>o (7)         | Mech_SD<br>(59)   | Mech_Nadir<br>(62) | Mech_Nadir<br>_SD (73) | Nadir_SD<br>(71) | Nadir_IMG_<br>Profile_SE<br>(50) | Nadir_TC_S<br>D (66) | Curr_LED_S<br>D (26) | STemp_Mech_<br>SD (30) | Temp_Nadir<br>_SD (28) | Volt_Mech_<br>SD (42) | Temp_Nadir<br>(24) | Temp_NP<br>(36) | Temp_TC<br>(35)     |       |
|        |            |                   |                 |           | 64                          | 112               | 88                 | 88                     | 64               | 360                              | 96                   | 16                   | 16                     | 48                     | 48                    | 176                | 16              | 16                  | 1     |
|        |            |                   |                 |           | 8                           | 14                | 11                 | 11                     | 8                | 45                               | 12                   | 2                    | 2                      | 6                      | 6                     | 22                 | 2               | 2                   | 1     |
|        |            |                   |                 |           | varies                      | varies            | varies             | varies                 | varies           | varies                           | zeros                | varies               | varies                 | varies                 | varies                | varies             | varies          | varies              |       |

Figure 4.3-47 OMPS First Grouped Diagnostic Nadir Profiler Calibration First Packet Format

MIDDLE PACKET

| ſ      |             |                   | PACKE           | T PRIMARY | HEADER            |                   |           | User Data Field      |       |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|-----------|----------------------|-------|
| Ī      | Verson      | Packet            | t Identifi      | cation    | Packet :          | Sequence          | Packet    | Science              |       |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length    | CCD data<br>(middle) | τοται |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16        | 8144                 | 8192  |
| Octets |             | -                 | 2               | -         | :                 | 2                 | 2         | 1018                 | 1024  |
| Value  | 000         | 0 /               | 0               | 0x245     | 00 1              | varies            | 0x03F9    | varies               |       |
| Tel    | emetry Pack | et                |                 |           |                   | Midd              | le Packet | - ROLAN              |       |

Figure 4.3-48 OMPS Grouped Diagnostic Nadir Profiler Calibration Middle Packet Format

LAST PACKET

|        |             |           | PACKE      | T PRIMARY | HEADER   |          |        | User Data Field |        |          | [      |
|--------|-------------|-----------|------------|-----------|----------|----------|--------|-----------------|--------|----------|--------|
|        | Verson      | Packet    | t Identifi | cation    | Packet   | Sequence | Packet | Science         |        |          |        |
|        | No.         | Type      | Sec Hdr    | APID      | Sequence | Sequence | Length | CCD data        | HW End | Pad Byte |        |
|        |             | Indicator | Flag       |           | Flags    | Count    |        | (end)           | Tag    |          | TOTAL  |
| Bits   | 3           | 1         | 1          | 11        | 2        | 14       | 16     | varies          | 32     | 8        | varies |
| Octets |             | -         | 2          |           |          | 2        | 2      | varies          | 4      | 1        | varies |
| Value  | 000         | 0 /       | 0          | 0x245     | 10       | varies   | varies | varies          | varies | varies   |        |
| Te     | emetry Pack | et        |            |           |          | Last     | Packet |                 |        |          | -      |



FIRST PACKET of a group, but not of the first group

| ſ      |        |           | PACKE       | T PRIMARY | HEADER                         |          |        | SEC      | ONDARY HEA | DER   |         | Us         | er Data Fie | eld      | 1     |
|--------|--------|-----------|-------------|-----------|--------------------------------|----------|--------|----------|------------|-------|---------|------------|-------------|----------|-------|
|        | Verson | Packet    | : Identifi  | cation 🔨  | Packet S                       | Sequence | Packet | Start of | Packets    | Spare | (       | OMPS Heade | r           | Science  | ]     |
|        | No.    | Туре      | Sec Hdr     | APID      | Sequence                       | Sequence | Length | Scan     | in RDR     |       | RDR     | Cont       | Cont Flag   | CCD data |       |
|        |        | Indicator | Flag        |           | Flags                          | Count    |        |          | - 1        |       | Version | Count      |             | (middle) | TOTAL |
|        |        |           |             |           |                                |          |        |          |            |       |         | -1         |             | ļ        | TOTAL |
| Bits   | 3      | 1         | 1           | 11        | 2                              | 14       | 16     | 64       | 8          | 8     | 16      | 8          | 8           | 8032     | 8192  |
| Octets |        | 2         | 2           |           |                                | 2        | 2      | 8        | 1          | 1     | 2       | 1          | 1           | 1004     | 1024  |
| Value  | 000    | , 0       | 1 ,         | 0x245     | 01                             | varies   | 0x03F9 | varies   | varies     | 0x00  | varies  | varies     | varies      | varies   | ]     |
| -      |        | Telem     | etry Packet |           | Secondary<br>leader<br>Present | ]        |        |          |            |       |         |            |             |          | -     |

# Figure 4.3-50 OMPS Grouped Diagnostic Nadir Profiler Calibration First Packet Format

| Table 4.3.16 OMPS Diagnostic Nadir Profiler Calibration Packet User Data Field |
|--------------------------------------------------------------------------------|
|--------------------------------------------------------------------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                                                                                           | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                                                  | N/A                        | N/A                                                                                                                    | <u> </u>  |
| 24        | 8           | SENSOR ID        | Indicates if this CCSDS packet begins an RDR<br>OMPS Sensor Identification (not for Dwell or FSW Bootup status) | N/A<br>N/A                 | N/A<br>N/A                                                                                                             |           |
| 40        | 8           | FSW VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version                               | N/A                        | N/A                                                                                                                    | U         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version                               | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                                                      | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB_SBC_ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)                                           | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                                                            | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)                                      | 0                          | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)                                        | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                             | 0                          | UNPROTECTED                                                                                                            | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                               | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                                                        | 0                          | Boot Side 1<br>Boot Side 2                                                                                             | U         |
| 96        | 7           | M_MCR_SPARE6     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 103       | 1           | M_MCR_L_SP_CTRL  | Limb Signal Processing Spare Control                                                                            | 0                          | OFF<br>ON                                                                                                              | U         |
| 104       | 3           | M_MCR_SPARE5     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 107       | 1           | M_MCR_N_SP_CTRL  | Nadir Signal Processing Spare Control                                                                           | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
| 108       | 3           | M_MCR_SPARE4     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 111       | 1           | M_MCR_TEST_2     | Test connector                                                                                                  | 0                          | OFF<br>ON                                                                                                              | U         |
| 112       | 7           | M_MCR_SPARE3     | Unused bits of the Miscellaneous Control Register                                                               | N/A                        | N/A                                                                                                                    | U         |
| 119       | 9           | M_CAL_LED_STATE  | State of the Calibration LEDs                                                                                   | 0                          | OFF<br>ON                                                                                                              | U         |
| 128       | 7           | M_THCR_SPARE7    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 135       | 1           | M_THCR_DAC_BUSY  | State of the DACBUSY line                                                                                       | 0                          | NOT_BUSY<br>BUSY                                                                                                       | U         |
| 136       | 3           | M_THCR_SPARE6    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 139       | 1           | M_TC_TEC_STATE   | State of the TC TEC Control                                                                                     | 0                          | OFF<br>ON                                                                                                              | U         |
| 140       | 3           | M_THCR_SPARE5    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 143       | 1           | M_NP_TEC_STATE   | State of the NP TEC Control                                                                                     | 0                          | OFF<br>ON                                                                                                              | U         |
| 144       | 3           | M_THCR_SPARE4    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 147       | 1           | M_LP_TEC_STATE   | State of the LP TEC Control                                                                                     | 0                          | OFF<br>ON                                                                                                              | U         |
| 148       | 3           | M_THCR_SPARE3    | Unused bits of the TEC & Heater Control & Status Register                                                       | N/A                        | N/A                                                                                                                    | U         |
| 151       | 1           | M_TC_HTR_STATE   | State of the TC CCD Window Heater Control                                                                       | 0<br>1                     | OFF<br>ON                                                                                                              | U         |
|           |             | - B              |                                                                                                                 |                            |                                                                                                                        |           |

| Table 4.3.16 OMPS Diagnostic Nadir Profiler Calibration Packet User Da | ata Fields (cont) |
|------------------------------------------------------------------------|-------------------|
|------------------------------------------------------------------------|-------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 0                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0                          | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0                          |                                                                            | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              | U         |
|           |             |                  |                                                           |                            |                                                                            |           |

| Table 4.3.16 O | OMPS Diagnostic | <b>Nadir Profiler</b> | <b>Calibration Page</b> | cket User Data | Fields (cont) |
|----------------|-----------------|-----------------------|-------------------------|----------------|---------------|
|----------------|-----------------|-----------------------|-------------------------|----------------|---------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|----------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                           | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                 | 0                          | OFF<br>ON                                                                  | U         |
| 208       | 1           | M_N_RESOLV_BUSY  | Nadir Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M_N_RESOLV_SPARE | Nadir Resolver Data Register - Unused Bits                     | N/A                        | N/A                                                                        | U         |
| 224       | 16          | M_N_RESOLV_DATA  | Nadir Resolver Data Register - Resolver Data                   | N/A                        | CW                                                                         | 0         |
| 240       | 7           | M_NMP_SPARE4     | Nadir Motor Parameter Register - Unused Bits                   | 1                          | CCW<br>CCW                                                                 | U         |
| 247       | 1           | M_N_DIRECTION    | Nadir Motor Direction                                          | 1                          | CW<br>CCW                                                                  | U         |
| 248       | 2           | M_NMP_SPARE3     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 250       | 2           | M_N_SPEED        | Nadir Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_NMP_SPARE2     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_N_PHASE        | Nadir Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_NMP_SPARE1     | Nadir Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_N_STEP_COUNT   | Nadir Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_N_RETRIES      | Nadir Motor Retries                                            | N/A                        | N/A                                                                        | <u> </u>  |
| 280       | 16          |                  | Commanded TC TEC Setaoint                                      | N/A<br>N/A                 | N/A N/A                                                                    |           |
| 312       | 16          |                  | Commanded TC CCD Window Heater Setpoint                        | N/A                        | N/A<br>N/A                                                                 | <u>U</u>  |
| 328       | 16          | M NP TEC SETPT   | Commanded NP TEC Setpoint                                      | N/A                        | N/A                                                                        | Ŭ         |
| 344       | 16          | M NP HTR SETPT   | Commanded NP CCD Window Heater Setpoint                        | N/A                        | N/A                                                                        | Ū         |
| 360       | 16          | M N POSITION     | Nadir Diffuser Motor Position                                  | N/A                        | N/A                                                                        | Ū         |
| 376       | 8           | M N POS ID       | Nadir Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 384       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 392       | 8           | N_TIM_PAT_VER    | Nadir Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 400       | 16          | N_IMG_STATUS     | Nadir Image Processing Status                                  | N/A                        | N/A                                                                        | U         |
| 416       | 32          | N_INT_HOLD_TIME  | Nadir TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             | - BR             |                                                                |                            |                                                                            |           |

| Table 4.3.16 | OMPS Diagnost | c Nadir Profiler | Calibration P | acket User Da | ta Fields (cont) |
|--------------|---------------|------------------|---------------|---------------|------------------|
|--------------|---------------|------------------|---------------|---------------|------------------|

|           |      |                  |                                                          |             | A                                                      |           |
|-----------|------|------------------|----------------------------------------------------------|-------------|--------------------------------------------------------|-----------|
|           |      |                  |                                                          | Linits      | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
| Start Bit | Bit  | Mnemonic Name    | Description                                              | OR          | OR                                                     | Data Type |
| otart bit | Size |                  | Beeenpater                                               | State Value | State Name                                             | Data Type |
|           |      |                  |                                                          |             |                                                        |           |
| 448       | 8    |                  | Active Nadir Profile ID                                  | N/A         | N/A<br>N/A                                             | 0         |
| 400       | 8    |                  | Nadir Imaging Profile Table Version Number major version | N/A         | N/A N/A                                                | 0         |
| 404       | 0    | N_PROFILE_VER    | Nadir Imaging Profile Table Version Number Minor Version | N/A         | N/A N/A                                                |           |
| 472       | 16   |                  | Nadir Titling Pattern Table ID                           | N/A<br>N/A  | N/A<br>N/A                                             | 0         |
| 504       | 16   |                  | Nadir Profiler Application ID                            | N/A         | N/A                                                    | <u> </u>  |
|           | 10   | N_B              | Hadii Honiol Application 15                              | 0           | DISABLED                                               |           |
| 520       | 8    | TC_LIN_CORR      | Nadir Total Column Linearity Correction Flag             | 1           | ENABLED                                                | U         |
| 528       | 16   | TC LIN CORR TBL  | Nadir Total Column Linearity Correction Table ID         | N/A         | N/A                                                    | U         |
| 544       | 16   | TC FIXED COADDS  | Nadir Total Column Fixed Coadd Count                     | N/A         | N/A                                                    | U         |
| 500       |      | TO REORDER INC   | Nadia Tatal Caluma Dacadas Imaga Flag                    | 0           | DISABLED                                               |           |
| 560       | 0    | IC_REORDER_IMG   | Nadir Total Column Reorder Image Flag                    | 1           | ENABLED                                                | U         |
| 569       | 0    | TC CAIN CORP     | Nodir Total Column Cain Correction Flog                  | 0           | DISABLED                                               |           |
| 500       | 0    | TC_GAIN_CORK     | Nadii Total Columni Gain Correction Liag                 | 1           | ENABLED                                                | 0         |
| 576       | 16   | TC_GAIN_CORR_TBL | Nadir Total Column Gain Correction Table ID              | N/A         | N/A                                                    | U         |
| 592       | 8    | TC BIN IMG       | Nadir Total Column Bin Image Flag                        | 0           | DISABLED                                               | U U       |
| 002       | •    | 10_010           | ridali rolar ostanin bir mitago ridg                     | 1           | ENABLED                                                | •         |
| 600       | 16   | TC_SAMP_TBL      | Nadir Total Column Sample Table ID                       | N/A         | N/A                                                    | U         |
| 616       | 8    | NP LIN CORR      | Nadir Profiler Linearity Correction Flag                 | 0           | DISABLED                                               | U         |
| 00.4      | 10   |                  | Nedla De film Line ett. One offen Table ID               | 1           | ENABLED                                                |           |
| 624       | 16   | NP_LIN_CORR_IBL  | Nadir Profiler Linearity Correction Table ID             | N/A         | N/A                                                    | 0         |
| 640       | 10   | NP_FIXED_COADDS  | Nadir Profiler Fixed Coadd Count                         | N/A         |                                                        | 0         |
| 656       | 8    | NP_REORDER_IMG   | Nadir Profilier Reorder Image Flag                       | 1           |                                                        | U         |
|           |      |                  |                                                          | 0           |                                                        |           |
| 664       | 8    | NP_GAIN_CORR     | Nadir Profilier Gain Correction Flag                     | 1           | ENABLED<br>ENABLED                                     | U         |
| 672       | 16   | NP GAIN CORR TBI | Nadir Profilier Gain Correction Table ID                 | N/A         | N/A                                                    | U         |
| 0,2       |      |                  |                                                          | 0           | DISABLED                                               |           |
| 688       | 8    | NP_BIN_IMG       | Nadir Profilier Bin Image Flag                           | 1           | ENABLED                                                | U         |
| 696       | 16   | NP SAMP TBL      | Nadir Profilier Sample Table ID                          | N/A         | N/A                                                    | U         |
| 712       | 8    | TC_GAIN_TBL_VER  | Nadir Total Column Gain Table Version major version      | N/A         | N/A                                                    | U         |
| 720       | 8    | TC GAIN TBL VER  | Nadir Total Column Gain Table Version minor version      | N/A         | N/A                                                    | U         |
| 728       | 8    | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version major version          | N/A         | N/A                                                    | U         |
| 736       | 8    | NP_GAIN_TBL_VER  | Nadir Profiler Gain Table Version minor version          | N/A         | N/A                                                    | U         |
| 744       | 8    | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version major version | N/A         | N/A                                                    | U         |
| 752       | 8    | TC_LIN_TBL_VER   | Nadir Total Column Linearity Table Version minor version | N/A         | N/A                                                    | U         |
| 760       | 8    | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version major version     | N/A         | N/A                                                    | U         |
| 768       | 8    | NP_LIN_TBL_VER   | Nadir Profiler Linearity Table Version minor version     | N/A         | N/A                                                    | U         |
| 776       | 8    | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version major version    | N/A         | N/A                                                    | U         |
| 784       | 8    | TC_SAMP_TBL_VER  | Nadir Total Column Sample Table Version minor version    | N/A         | N/A                                                    | 0         |
| /92       | 8    | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version major version        | N/A         | N/A                                                    | 0         |
| 800       | 8    | NP_SAMP_TBL_VER  | Nadir Profiler Sample Table Version minor version        | N/A         | N/A                                                    | U         |
|           |      |                  |                                                          |             |                                                        |           |

| Table 4.3.16 | <b>OMPS</b> Diagnostic | Nadir Profiler | Calibration P | Packet User Dat | a Fields (cont) |
|--------------|------------------------|----------------|---------------|-----------------|-----------------|
|              | • • =                  |                |               |                 |                 |

|           |             |                  |                                                |              | A                                                                                                                                                                                                                                   |           |
|-----------|-------------|------------------|------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR                                                                                                                                                                        | Data Type |
|           |             |                  |                                                | State value  | State Marine                                                                                                                                                                                                                        |           |
| 808       | 16          | NP_ROWS          | Rows of Nadir Total Column CCD data            | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 824       | 16          | NP_COLS          | Columns of Nadir Total Column CCD data         | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 840       | 16          | NP_LAST_IMG_DOY  | Time stamp of last good TC image (day of year) | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 856       | 32          | NP_LAST_IMG_MSEC | Time stamp of last good TC image               | milliseconds | N/A                                                                                                                                                                                                                                 | U         |
| 888       | 16          | NP_LAST_IMG_USEC | Time stamp of last good TC image               | microseconds | N/A                                                                                                                                                                                                                                 | U         |
| 904       | 16          | M_I_CAL_LED      | Current in the active Calibration LED          | milliamps    | -, -, -, 0.005086, 0                                                                                                                                                                                                                | S         |
| 920       | 16          | M_T_MTR_DRV_BD   | Temperature - Motor Driver Board               | Celsius      | -, -, -, 0.0484, -273.15                                                                                                                                                                                                            | S         |
| 936       | 16          | N_T_TELESCOPE    | Temperature - Nadir Telescope                  | Celsius      | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43 02<br>1796 to 32767: -, -9.53E-11, 1.817E-6, -0.01566, 7.7      | S         |
| 952       | 16          | TC_T_CCD         | Temperature - Nadir Total Column CCD           | Celsius      | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                          | S         |
| 968       | 16          | NP_T_CCD         | Temperature - Nadir Profiler CCD               | Celsius      | -, -, -, -, -0.00737, 3.76                                                                                                                                                                                                          | S         |
| 984       | 16          | M_V_MTR_RES_5V   | Voltage - Motor/Resolver Electronics +5V       | Volts        | -, -, -, 0.00311,0                                                                                                                                                                                                                  | S         |
| 1000      | 16          | M_V_RES_12V      | Voltage - Resolver Electronics +12V            | Volts        | -, -, -, 0.00311,0                                                                                                                                                                                                                  | S         |
| 1016      | 16          | M_V_RES_M12V     | Voltage - Resolver Electronics -12V            | Volts        | -, -, -, 0.00311,0                                                                                                                                                                                                                  | S         |
| 1032      | 16          | N_T_MOTOR        | Temperature - Nadir Diffuser Motor             | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1048      | 16          | N_T_HOUSING      | Temperature - Nadir Calibration Housing        | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1064      | 16          | N_T_SUN_SIDE     | Temperature - Nadir Sun Side                   | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1080      | 16          | N_T_DARK_SIDE    | Temperature - Nadir Dark Side                  | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1096      | 16          | TC_T_COND_BAR    | Temperature - TC Conductor Bar                 | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1112      | 16          | NP_T_COND_BAR    | Temperature - NP Conductor Bar                 | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1128      | 16          | TC_P_HTR_SET     | Power Setpoint - TC Window Heater              | Watts        | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                              |           |
| 1144      | 16          | NP_P_HTR_SET     | Power Setpoint - NP Window Heater              | Watts        | -, -, 5.76E-8, 0, 0                                                                                                                                                                                                                 | S         |
| 1160      | 16          | N_T_SIG_BD       | Temperature - Nadir Signal Board               | Celsius      | -, -, -, 0.1233, -273.15                                                                                                                                                                                                            | S         |
| 1176      | 16          | N_T_TIM_BD       | Temperature - Nadir Timing Board               | Celsius      | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1192      | 16          | TC_T_HOUSING     | Temperature - TC Housing.                      | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7, 7 | s         |
| 1208      | 16          | NP_T_WINDOW      | Temperature - NP Window                        | Celsius      | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1224      | 16          | TC_T_WINDOW      | Temperature - TC Window                        | Celsius      | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1240      | 32          | N/A              | HW Start Tag (if image is not sampled)         | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 1272      | varies      | N/A              | CCD Data (# pixels x 32 bits/pixel)            | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| varies    | 32          | N/A              | HW End Tag (if image is not sampled)           | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| varies    | 8           | N/A              | Pad Byte                                       | N/A          | N/A                                                                                                                                                                                                                                 | U         |
|           |             | - The            |                                                |              |                                                                                                                                                                                                                                     |           |

#### 4.3.7.10 Diagnostic Limb Profiler Calibration

The Diagnostic Limb Profiler Calibration packet is output in APID 582 when requested in order to diagnose anomalies. The User Data Field contains the OMPS Header, OMPS engineering data and the CCD Data. The size of the CCD Data is configurable with a maximum of 364 x 780 pixels. If all the CCD pixels are sent unbinned, five grouped APID 582 packets are required. Each of the five packets is a grouped packet. Only the first of the five grouped packets contains the engineering data. The first CCSDS packet of each of the five groups contains a secondary header and the OMPS header.

Because the size of APID 582 is configurable, Figure 4.3-51 to Figure 4.3-55 below show the packet structure of a standalone diagnostic packet, the first packet of the first grouped packet, the middle and last of the grouped packets and the first packet of any but the first group of packets. These figures give a good indication of the structure but are not meant to be a comprehensive presentation of every configuration of the multiple grouped packets. Table 4.3.17 lists the user data fields as if multiple groups of packets were unnecessary.

| Generic Sta | ndalone    |                   |                 |           |                   |                   |         |           |             |         |                   |                  | O D       |            |             |              |                 |           |            |          |        |
|-------------|------------|-------------------|-----------------|-----------|-------------------|-------------------|---------|-----------|-------------|---------|-------------------|------------------|-----------|------------|-------------|--------------|-----------------|-----------|------------|----------|--------|
|             |            |                   | PACKE           | T PRIMARY | HEADER            |                   |         | SE        | CONDARY HEA | DER     |                   |                  |           |            | User        | Data Field   |                 |           |            |          | I      |
|             | Verson No. | Packe             | t Identific     | ation     | Packet            | Sequence          | Packet  | Start of  | Packets in  | Spare   |                   | OMPS Heade       | r         | E          | ngineering  | Data         |                 | Scie      | nce        |          | 1      |
|             |            | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length  | Scan      | RDR<br>- 1  |         | RDR<br>Version    | Cont Count<br>-1 | Cont Flag | Engin      | eering Data | Sections     | HW Start<br>Tag | CCD data  | HW End Tag | Pad Byte | τοται  |
| Bits        | 3          | 1                 | 1               | 11        | 2                 | 14                | 16      | 64        | 8           | 8       | 16                | 8                | 8         |            | 1096        |              | 32              | varies    | 32         | 8        | varies |
| Octets      |            |                   | 2               |           |                   | 2                 | 2       | 8         | 1           | 1       | 2                 | 1                | 1         |            | 137         |              | 4               | varies    | 4          | 1        | varies |
| Value       | 000        | <u>\</u> 0        | 1               | 0x246     | 01                | varies            | varies  | varies    | 0x00        | 0x00    | varies            | varies           | varies    |            | varies      |              | varies          | varies    | varies     | varies   |        |
|             |            |                   |                 | Sec       | condary<br>ader   | r                 |         |           |             |         | <u>,</u> ,        | Engineerin       | - Data    |            |             |              |                 |           | т          |          |        |
|             |            | Telerr            | netry Packet    | Pre       | sent              | Sensor Inf        | Mech SD | Mech Limb | Mach Limb   | Limb SD | Limb IMG I        | PLimb 1st 9      | Juala     | Curr LED 9 | Temp Mech   | Temp Limb SD | Volt Mech S     | Temp Limb | 4          |          |        |
|             |            |                   |                 |           |                   | o (7)             | (59)    | (63)      | (72)        | (65)    | rofile_SD<br>(51) | D (49)           | D (67)    | D (26)     | SD (30)     | (29)         | D (42)          | (25)      |            |          |        |
|             |            |                   |                 |           |                   | 64                | 112     | 88        | 56          | 96      | 264               | 64               | 64        | 16         | 16          | 64           | 48              | 144       | 1          |          |        |
|             |            |                   |                 |           |                   | 8                 | 14      | 11        | 7           | 12      | 33                | 8                | 8         | 2          | 2           | 8            | 6               | 18        | ]          |          |        |
|             |            |                   |                 |           |                   | varies            | varies  | varies    | varies      | varies  | varies            | varies           | varies    | varies     | varies      | varies       | varies          | varies    | ]          |          |        |

# Figure 4.3-51 OMPS Ungrouped Diagnostic Limb Profiler Calibration Packet Format

8 HI CHOITOR

FIRST PACKET

| ſ      |                  |                   | PACKE           | T PRIMARY | HEADER            |                     |                 | SE                | CONDARY HEA       | DER             |                                 |                      |                      |                      | User                  | Data Field           |                       |                   |                 |                     | 1     |
|--------|------------------|-------------------|-----------------|-----------|-------------------|---------------------|-----------------|-------------------|-------------------|-----------------|---------------------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|-----------------------|-------------------|-----------------|---------------------|-------|
|        | Verson No.       | . Packe           | t Identifio     | cation    | Packet            | Sequence            | Packet          | Start of          | Packets in        | Spare           |                                 | OMPS Heade:          | r                    |                      |                       | Engineering Dat      | a                     |                   | Scie            | ence                |       |
|        |                  | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count   | Length          | Scan              | RDR<br>- 1        |                 | RDR<br>Version                  | Cont Count<br>-1     | Cont Flag            |                      | En                    | gineering Data Se    | ctions                |                   | HW Start<br>Tag | CCD data<br>(start) | TOTAL |
| Bits   | 3                | 1                 | 1               | 11        | 2                 | 14                  | 16              | 64                | 8                 | 8               | 16                              | 8                    | 8                    |                      |                       | 1096                 |                       |                   | 32              | 6904                | 8192  |
| Octets |                  |                   | 2               | •         |                   | 2                   | 2               | 8                 | 1                 | 1               | 2                               | 1                    | 1                    |                      |                       | 137                  |                       |                   | 4               | 863                 | 1024  |
| Value  | 000              | <u>ر</u> ٥        | 1               | 0x246     | 01                | varies              | 0x03F9          | varies            | varies            | 0×0             | varies                          | varies               | varies               |                      |                       | varies               |                       |                   | varies          | varies              |       |
|        | Telemetry Packet |                   |                 |           |                   |                     |                 |                   |                   |                 | Engineering                     | g Data               |                      |                      |                       |                      |                       | [                 |                 |                     |       |
|        |                  |                   |                 |           | esent             | Sensor_Inf<br>o (7) | Mech_SD<br>(59) | Mech_Limb<br>(63) | Mech_Limb<br>(72) | Limb_SD<br>(65) | Limb_IMG_P<br>rofile_SD<br>(51) | Limb_1st_S<br>D (49) | Limb_2nd_S<br>D (67) | Curr_LED_S<br>D (26) | Temp_Mech_<br>SD (30) | Temp_Limb_SD<br>(29) | Volt_Mech_S<br>D (42) | Temp_Limb<br>(25) |                 |                     |       |
|        |                  |                   |                 |           |                   | 64                  | 112             | 88                | 56                | 96              | 264                             | 64                   | 64                   | 16                   | 16                    | 64                   | 48                    | 144               |                 |                     |       |
|        |                  |                   |                 |           |                   | 8                   | 14              | 11                | 7                 | 12              | 33                              | 8                    | 8                    | 2                    | 2                     | 8                    | 6                     | 18                |                 |                     |       |
|        |                  |                   |                 |           |                   | varies              | varies          | varies            | varies            | varies          | varies                          | varies               | varies               | varies               | varies                | varies               | varies                | varies            | l               |                     |       |

# Figure 4.3-52 OMPS First Grouped Diagnostic Limb Profiler Calibration First Packet Format

MIDDLE PACKET

| Ĩ      |             |                   | PACKE           | T PRIMARY | HEADER            |                   |           | User Data Field            |
|--------|-------------|-------------------|-----------------|-----------|-------------------|-------------------|-----------|----------------------------|
|        | Verson      | Packe             | t Identifi      | cation    | Packet            | Sequence          | Packet    | Science                    |
|        | No.         | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length    | CCD data<br>(middle) TOTAL |
| Bits   | 3           | 1                 | 1               | 11        | 2                 | 14                | 16        | 8144 8192                  |
| Octets |             |                   | 2               |           |                   | 2                 | 2         | 1018 1024                  |
| Value  | 000         | 0 /               | 0               | 0x246     | 00                | varies            | 0x03F9    | varies                     |
| Tel    | emetry Pack | et                |                 | -         |                   | Midd              | le Packet | ROLL                       |

Figure 4.3-53 OMPS Grouped Diagnostic Limb Profiler Calibration Middle Packet Format

LAST PACKET

| Г      |              |                   | DACKE           | T DDIMADY | UFADED            |                   |        | User Data Field   |               |          | ٦      |
|--------|--------------|-------------------|-----------------|-----------|-------------------|-------------------|--------|-------------------|---------------|----------|--------|
| ł      | Verson       | Packe             | t Identifi      | cation    | Packet :          | Sequence          | Packet | Science           |               |          |        |
|        | No.          | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length | CCD data<br>(end) | HW End<br>Tag | Pad Byte | ΤΟΤΑΙ  |
| Bits   | 3            | 1                 | 1               | 11        | 2                 | 14                | 16     | varies            | 32            | 8        | varies |
| Octets |              |                   | 2               | •         |                   | 2                 | 2      | varies            | 4             | 1        | varies |
| Value  | 000          | 0 /               | 0               | 0x246     | 10                | varies            | varies | varies            | varies        | varies   | 1      |
| Tel    | lemetry Pack | et                |                 |           |                   | Last              | Packet |                   |               |          | -      |





#### Figure 4.3-55 OMPS Grouped Diagnostic Limb Profiler Calibration First Packet Format

| Table 4.3.17 | <b>OMPS</b> Diagnostic | <b>Limb Profiler</b> | Calibration | Packet User | <b>Data Field</b> |
|--------------|------------------------|----------------------|-------------|-------------|-------------------|
|--------------|------------------------|----------------------|-------------|-------------|-------------------|

| Start Bit         | Bit<br>Size | Mnemonic Name                                     | Description                                                                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                              | Data Type   |
|-------------------|-------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------|-------------------------------------------------------------------------------------------------------------------------|-------------|
| 0                 | 16          | CCSDS_RDR_VER                                     | Version Number of RDR                                                                                                           | N/A                        | N/A                                                                                                                     | U           |
| 16                | 8           | CCSDS_CONT_COUNT                                  | Number of segmented CCSDS packet sequences - 1                                                                                  | N/A                        | N/A                                                                                                                     | U           |
| 24                | 8           | SENSOR ID                                         | OMPS Sensor Identification (not for Dwell or ESW/ Regtup statue)                                                                | N/A<br>N/A                 | N/A                                                                                                                     |             |
| 40                | 8           | ESW VERSION                                       | Elight Software Version Number (not for Dwell or ESW Bootup status) major version                                               | N/A                        | N/A                                                                                                                     | <u> </u>    |
| 48                | 8           | FSW VERSION                                       | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version                                               | N/A                        | N/A                                                                                                                     | Ŭ           |
| 56                | 2           | MEB_BOOT_IMG_ID                                   | Boot Image Identifier (not for Dwell or FSW Bootup status)                                                                      | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debua Monitor (TDM-which we should never boot from) | U           |
| 58                | 5           | MEB_SBC_ID                                        | Single Board Computer Identifier (not for Dwell or FSW Bootup status)                                                           | N/A                        | N/A                                                                                                                     | U           |
| 63                | 1           | MEB_SIDE                                          | Active MEB Side (not for Dwell or FSW Bootup status)                                                                            | 0                          | MEB2<br>MEB1                                                                                                            | U           |
| 64                | 8           | FSW_INIT_STATUS                                   | Flight Software Initialization Status (not for Dwell or FSW Bootup status)                                                      | 0-1                        | OK<br>ERROR                                                                                                             | U           |
| 72                | 8           | FSW_INIT_CODE                                     | Flight Software Initialization Code (not for Dwell or FSW Bootup status)                                                        | N/A                        | N/A                                                                                                                     | U           |
| 80                | 8           | FSW_PROTECTED                                     | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)                                                             | 1<br>0                     | PROTECTED<br>UNPROTECTED                                                                                                | U           |
| 88                | 4           | MEB_FLASH_PWR                                     | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                                                               | 0 1                        | OFF<br>ON                                                                                                               | U           |
| 92                | 4           | EEPROM_SIDE                                       | EEPROM side used to boot                                                                                                        | 0                          | Boot Side 1                                                                                                             | U           |
| 96                | 7           | M MCR SPARE6                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 103               | 1           | M_MCR_L_SP_CTRL                                   | Limb Signal Processing Spare Control                                                                                            | 0                          | OFF                                                                                                                     | U           |
| 104               | 3           | M MCR SPARE5                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 107               | 1           | M_MCR_N_SP_CTRL                                   | Nadir Signal Processing Spare Control                                                                                           | 0                          | OFF                                                                                                                     | U           |
| 108               | 3           | M_MCR_SPARE4                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 111               | 1           | M_MCR_TEST_2                                      | Test connector                                                                                                                  | 0<br>1                     | OFF<br>ON                                                                                                               | U           |
| 112               | 7           | M_MCR_SPARE3                                      | Unused bits of the Miscellaneous Control Register                                                                               | N/A                        | N/A                                                                                                                     | U           |
| 119               | 9           | M_CAL_LED_STATE                                   | State of the Calibration LEDs                                                                                                   | 0<br>1                     | OFF<br>ON                                                                                                               | U           |
| 128               | 7           | M_THCR_SPARE7                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 135               | 1           | M_THCR_DAC_BUSY                                   | State of the DACBUSY line                                                                                                       | 0                          | NOT_BUSY<br>BUSY                                                                                                        | U           |
| 136               | 3           | M_THCR_SPARE6                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 139               | 1           | M_TC_TEC_STATE                                    | State of the TC TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 140               | 3           | M_THCR_SPARE5                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 143               | 1           | M_NP_TEC_STATE                                    | State of the NP TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 144               | 3           | M THCR SPARE4                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 147               | 1           | M_LP_TEC_STATE                                    | State of the LP TEC Control                                                                                                     | 0                          | OFF                                                                                                                     | U           |
| 148               | 3           | M THCR SPARE3                                     | Unused bits of the TEC & Heater Control & Status Register                                                                       | N/A                        | N/A                                                                                                                     | U           |
| 151               | 1           | M_TC_HTR_STATE                                    | State of the TC CCD Window Heater Control                                                                                       | 0                          | OFF                                                                                                                     | U           |
| 147<br>148<br>151 | 1           | M_LP_TEC_STATE<br>M_THCR_SPARE3<br>M_TC_HTR_STATE | State of the LP TEC Control Unused bits of the TEC & Heater Control & Status Register State of the TC CCD Window Heater Control | 0<br>1<br>N/A<br>0<br>1    | OFF<br>ON<br>N/A<br>OFF<br>ON                                                                                           | U<br>U<br>U |

| Table 4.3.17 OMPS Dia | agnostic Limb Profiler Cali | ibration Packet User Data I | Field (cont) |
|-----------------------|-----------------------------|-----------------------------|--------------|
|-----------------------|-----------------------------|-----------------------------|--------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 152       | 3           | M_THCR_SPARE2    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 155       | 1           | M_NP_HTR_STATE   | State of the NP CCD Window Heater Control                 | 1                          | OFF                                                                        | U         |
| 156       | 3           | M_THCR_SPARE1    | Unused bits of the TEC & Heater Control & Status Register | N/A                        | N/A                                                                        | U         |
| 159       | 1           | M_LP_HTR_STATE   | State of the LP CCD Window Heater Control                 | 0<br>1                     | OFF<br>ON                                                                  | U         |
| 160       | 1           | MEB_LP_HTR_PWR   | LP Window Heater Power State                              | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 161       | 1           | MEB_NP_HTR_PWR   | NP Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 162       | 1           | MEB_TC_HTR_PWR   | TC Window Heater Power State                              | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 163       | 1           | MEB_LP_TEC_PWR   | LP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 164       | 1           | MEB_NP_TEC_PWR   | NP TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 165       | 1           | MEB_TC_TEC_PWR   | TC TEC Power State                                        | 0                          | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 166       | 1           | MEB_L_MTR_RELAY  | Limb Motor Relay Position                                 | 0                          | CLOSED<br>OPEN                                                             | U         |
| 167       | 1           | MEB_N_MTR_RELAY  | Nadir Motor Relay Position                                | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 168       | 1           | MEB_L_PWR        | Limb Power Supply State                                   | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 169       | 1           | MEB_N_PWR        | Nadir Power Supply State                                  | 0<br>1                     | PWR_ENABLED<br>PWR_DISABLED                                                | U         |
| 170       | 1           | MEB_BOOT_SEL_1   | Boot Select Bit 1 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 171       | 1           | MEB_BOOT_SEL_0   | Boot Select Bit 0 Relay Position                          | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 172       | 1           | MEB_L_CLKDRV_RED | Limb Clock Drive Relay Redundant Position                 | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 173       | 1           | MEB_L_CLKDRV_PRI | Limb Clock Drive Relay Primary Position                   | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 174       | 1           | MEB_N_CLKDRV_RED | Nadir Clock Drive Relay Redundant Position                | 0<br>1                     | ALL_REDUNDANT<br>NOT_REDUNDANT                                             | U         |
| 175       | 1           | MEB_N_CLKDRV_PRI | Nadir Clock Drive Relay Primary Position                  | 0<br>1                     | ALL_PRIMARY<br>NOT_PRIMARY                                                 | U         |
| 176       | 10          | M_MCSR_SPARE6    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 186       | 1           | M_L_XMEB_RELAY   | Position of Non-Operating MEB Limb Motor Relay            | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 187       | 1           | M_N_XMEB_RELAY   | Position of Non-Operating MEB Nadir Motor Relay           | 0<br>1                     | CLOSED<br>OPEN                                                             | U         |
| 188       | 3           | M_MCSR_SPARE5    | Unused register bits                                      | 0<br>1                     | OPEN<br>CLOSED                                                             | U         |
| 191       | 1           | M_MTR_ACTIVE     | Motor Control Circuitry Active                            | 0                          | INACTIVE<br>ACTIVE                                                         | U         |
| 192       | 3           | M_MCSR_SPARE4    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 195       | 1           | M_RELAY_POS      | Relay Position                                            | 0                          | OPEN<br>CLOSED                                                             | U         |
| 196       | 3           | M_MCSR_SPARE3    | Unused register bits                                      | 0                          | OPEN<br>CLOSED                                                             | U         |
| 199       | 1           | M_MTR_SELECT     | Motor Select                                              | 0<br>1                     | NADIR<br>LIMB                                                              | U         |

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|------------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 200       | 3           | M_MCSR_SPARE2    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 203       | 1           | M_RES_ENABLE     | Resolver Circuitry Enable                                     | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 204       | 3           | M_MCSR_SPARE1    | Unused register bits                                          | 0                          | OPEN<br>CLOSED                                                             | U         |
| 207       | 1           | M_MTR_RES_PWR    | Motor and Resolver Power State                                | 0                          | OFF                                                                        | U         |
| 208       | 1           | M_L_RESOLV_BUSY  | Limb Resolver Data Register - Busy                            | 0                          | NOT_BUSY<br>BUSY                                                           | U         |
| 209       | 15          | M L RESOLV SPARE | Limb Resolver Data Register - Unused Bits                     | N/A                        | NA                                                                         | U         |
| 224       | 16          | M L RESOLV DATA  | Limb Resolver Data Register - Resolver Data                   | N/A                        | N/A                                                                        | Ū         |
| 240       | 7           | M_LMP_SPARE4     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW                                                                         | U         |
| 247       | 1           | M_L_DIRECTION    | Limb Motor Direction                                          | 0                          | CW                                                                         | U         |
| 248       | 2           | M_LMP_SPARE3     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CCW                                                                        | U         |
| 250       | 2           | M_L_SPEED        | Limb Motor Speed                                              | 0<br>1<br>2<br>3           | STEPS_SEC_300<br>STEPS_SEC_200<br>STEPS_SEC_100<br>STEPS_SEC_10            | U         |
| 252       | 2           | M_LMP_SPARE2     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 254       | 2           | M_L_PHASE        | Limb Motor Phase                                              | 0<br>1<br>2<br>3           | INVALID<br>A_MINUS_B_PLUS<br>A_MINUS_B_MINUS<br>A_PLUS_B_MINUS             | U         |
| 256       | 4           | M_LMP_SPARE1     | Limb Motor Parameter Register - Unused Bits                   | 0                          | CW<br>CCW                                                                  | U         |
| 260       | 12          | M_L_STEP_COUNT   | Limb Motor Step Count                                         | N/A                        | N/A                                                                        | U         |
| 272       | 8           | M_L_RETRIES      | Limb Motor Retries                                            | N/A                        | N/A                                                                        | U         |
| 280       | 16          | M_L_DESTINATION  | Limb Diffuser Move Destination                                | N/A                        | N/A                                                                        | U         |
| 296       | 16          | M_LP_TEC_SETPT   | Commanded LP TEC Setpoint                                     | N/A                        | N/A                                                                        | U         |
| 312       | 16          | M_LP_HTR_SETPT   | Commanded LP CCD Window Heater Setpoint                       | N/A                        | N/A                                                                        | U         |
| 328       | 16          | M_L_POSITION     | Limb Diffuser Motor Position                                  | N/A                        | N/A                                                                        | U         |
| 344       | 8           | M_L_POS_ID       | Limb Diffuser Position ID                                     | N/A                        | N/A                                                                        | U         |
| 352       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 360       | 8           | L_TIM_PAT_VER    | Limb Active Timing Pattern Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 368       | 16          | L_ROWS           | Rows of Limb Profiler CCD data                                | N/A                        | N/A                                                                        | U         |
| 384       | 16          | L_COLS           | Columns of Limb Profiler CCD data                             | N/A                        | N/A                                                                        | U         |
| 400       | 16          | L_IMG_STATUS     | Limb Image Processing Status Word                             | N/A                        | N/A                                                                        | U         |
| 416       | 32          | L_INT_HOLD_TIME  | Limb TPG Integration Hold Time                                | milliseconds               | -, -, -, 0.1,0                                                             | U         |
|           |             |                  |                                                               |                            |                                                                            |           |

| Table 4.3.17 | <b>OMPS</b> Diagnostic | <b>Limb Profiler</b> | <b>Calibration Pac</b> | ket User Data | Field (cont) |
|--------------|------------------------|----------------------|------------------------|---------------|--------------|
|--------------|------------------------|----------------------|------------------------|---------------|--------------|

| Start Bit | Bit<br>Size | Mnemonic Name   | Description                                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|-----------------|--------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 448       | 8           | L PROFILE ID    | Active Limb Profile ID                                       | N/A                        | N/A                                                                        | U         |
| 456       | 8           | L PROFILE VER   | Limb Imaging Profile Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 464       | 8           | L_PROFILE_VER   | Limb Imaging Profile Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 472       | 16          | L_TIM_PAT_TBL   | Limb Timing Pattern Table ID                                 | N/A                        | N/A                                                                        | U         |
| 488       | 16          | L1_APID         | Limb Profiler Image #1 Application ID                        | N/A                        | N/A                                                                        | U         |
| 504       | 16          | L2_APID         | Limb Profiler Image #2 Application ID                        | N/A                        | N/A                                                                        | U         |
| 520       | 8           | L_LIN_CORR      | Limb Linearity Correction Flag                               | 0<br>1                     | DISABLED<br>ENABLED                                                        | U         |
| 528       | 16          | L LIN CORR TBL  | Limb Linearity Correction Table ID                           | N/A                        | N/A                                                                        | U         |
| 544       | 16          | L FIXED COADDS  | Limb Fixed Coadd Count                                       | N/A                        | N/A                                                                        | U         |
| 560       | 8           | L_REORDER_IMG   | Limb Reorder Image Flag                                      | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 568       | 8           | L_GAIN_CORR     | Limb Gain Correction Flag                                    | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 576       | 16          | L GAIN CORR TBL | Limb Gain Correction Table ID                                | N/A                        | N/A                                                                        | U         |
| 592       | 8           | L1_BIN_IMG      | Limb Profiler Image #1 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 600       | 16          | L1_SAMP_TBL     | Limb Profiler Image #1 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 616       | 8           | L2_BIN_IMG      | Limb Profiler Image #2 Bin Image Flag                        | 0                          | DISABLED<br>ENABLED                                                        | U         |
| 624       | 16          | L2_SAMP_TBL     | Limb Profiler Image #2 Sample Table ID                       | N/A                        | N/A                                                                        | U         |
| 640       | 8           | L_2ND_IMAGE     | Limb Profiler Second Image Flag                              | 0<br>1                     | FALSE<br>TRUE                                                              | U         |
| 648       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number major version                 | N/A                        | N/A                                                                        | U         |
| 656       | 8           | L GAIN TBL VER  | Limb Gain Table Version Number minor version                 | N/A                        | N/A                                                                        | U         |
| 664       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number major version | N/A                        | N/A                                                                        | U         |
| 672       | 8           | L_LIN_TBL_VER   | Limb Linearity Correction Table Version Number minor version | N/A                        | N/A                                                                        | U         |
| 680       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 688       | 8           | L1_SAMP_TBL_VER | Limb Image #1 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |
| 696       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number major version      | N/A                        | N/A                                                                        | U         |
| 704       | 8           | L2_SAMP_TBL_VER | Limb Image #2 Sample Table Version Number minor version      | N/A                        | N/A                                                                        | U         |

| Table 4.3.17 | <b>OMPS</b> Diagnostic | Limb Profiler | Calibration | Packet User | Data Field (cont) |
|--------------|------------------------|---------------|-------------|-------------|-------------------|
|--------------|------------------------|---------------|-------------|-------------|-------------------|

|           |              |                  |                                                     |              | *                                                                                                                                                                                                                                   |           |
|-----------|--------------|------------------|-----------------------------------------------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Bit          | Mnemonic Name    | Description                                         | Units<br>OR  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR                                                                                                                                                                        | Data Type |
|           | Size         |                  |                                                     | State Value  | State Name                                                                                                                                                                                                                          |           |
| 712       | 16           | L1 LAST IMG DOY  | Time stamp of last good Limb Image #1 (day of year) | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 728       | 32           | L1 LAST IMG MSEC | Time stamp of last good Limb Image #1               | milliseconds | N/A                                                                                                                                                                                                                                 | Ū         |
| 760       | 16           | L1 LAST IMG USEC | Time stamp of last good Limb Image #1               | microseconds | N/A                                                                                                                                                                                                                                 | Ū         |
| 776       | 16           | L2 LAST IMG DOY  | Time stamp of last good Limb Image #2 (day of year) | N/A          | N/A                                                                                                                                                                                                                                 | U         |
| 792       | 32           | L2 LAST IMG MSEC | Time stamp of last good Limb Image #2               | milliseconds | N/A                                                                                                                                                                                                                                 | U         |
| 824       | 16           | L2_LAST_IMG_USEC | Time stamp of last good Limb Image #2               | microseconds | N/A                                                                                                                                                                                                                                 | U         |
| 840       | 16           | M_I_CAL_LED      | Current in the active Calibration LED               | milliamps    | -, -, -, 0.005086, 0                                                                                                                                                                                                                | S         |
| 856       | 16           | M_T_MTR_DRV_BD   | Temperature - Motor Driver Board                    | Celsius      | -, -, -, 0.0484, -273.15                                                                                                                                                                                                            | S         |
| 872       | 16           | L_T_TELESCOPE    | Temperature - Limb Telescope                        | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 888       | 16           | L_T_PRISM_1      | Temperature - Limb Prism #1                         | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 904       | 16           | L_T_PRISM_2      | Temperature - Limb Prism #2                         | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.52E-11, 1.817E-6, -0.01566, 7, 7 | s         |
| 920       | 16           | L T CCD          | Temperature - Limb CCD                              | Celsius      | 0.0238.58.05                                                                                                                                                                                                                        | S         |
| 936       | 16           | M V MTR RES 5V   | Voltage - Motor/Resolver Electronics +5V            | Volts        | 0.00311.0                                                                                                                                                                                                                           | S         |
| 952       | 16           | M V RES 12V      | Voltage - Resolver Electronics +12V                 | Volts        | -, -, -, 0.00311, 0                                                                                                                                                                                                                 | S         |
| 968       | 16           | M_V_RES_M12V     | Voltage - Resolver Electronics -12V                 | Volts        | -, -, -, 0.00311,0                                                                                                                                                                                                                  | S         |
| 984       | 16           | L_T_MOTOR        | Temperature - Limb Diffuser Motor                   | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1000      | 16           | L_T_HOUSING      | Temperature - Limb Housing                          | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7, 7 | s         |
| 1016      | 16           | L_T_SUN_SIDE     | Temperature - Limb Sun Side                         | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | S         |
| 1032      | 16           | L_T_DARK_SIDE    | Temperature - Limb Dark Side                        | Celsius      | -32768 to 83: -, -, -8.469E-5, 0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6, 0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7  | s         |
| 1048      | 16           | L_T_COND_BAR     | Temperature - Limb Conductor Bar                    | Celsius      | -32768 to 83: -, -, -8.469E-5.0.02033, -1.99, 128.8<br>84 to 343: -, -, -1.465E-6.0.001323, -0.4741, 86.11<br>344 to 1795: -, -, -1.044E-8, 4.681E-5, -0.08272, 43.02<br>1796 to 32767: -, -, -9.53E-11, 1.817E-6, -0.01566, 7.7    | s         |
| 1064      | 16           | L_T_WINDOW       | Temperature - Limb Window                           | Celsius      | -, -, -, 0.0486, -273.15                                                                                                                                                                                                            | S         |
| 1080      | 16           |                  | Power Setpoint - Limb CCD Window Heater             | Watts        | -, -, -, 5.76E-8, 0, 0                                                                                                                                                                                                              | S         |
| 1096      | 16           |                  | I emperature - Nadir Signal Board                   | Celsius      | -, -, -, 0.0486, -2/3.15                                                                                                                                                                                                            | 5         |
| 1112      | 16           |                  | i emperature - Nadir Timing Board                   |              | -, -, -, U.U486, -273.15<br>N/A                                                                                                                                                                                                     | 5         |
| 1120      | JZ<br>Varies | N/A<br>N/A       | CCD Data (# nivels x 32 bits/nivel)                 | N/A<br>N/A   | N/Α<br>N/Δ                                                                                                                                                                                                                          |           |
| varies    | 32           | N/A<br>N/A       | HW/ End Tag (if image is not sampled)               | N/A          | N/A<br>N/A                                                                                                                                                                                                                          |           |
| varies    | 8            | N/A              | Pad Byte                                            | N/A          | N/A                                                                                                                                                                                                                                 | - U       |
|           |              | - B              |                                                     |              |                                                                                                                                                                                                                                     |           |

#### 4.3.7.11 Dwell Data

The OMPS can be commanded to produce a packet with dwell telemetry once per second. Each dwell packet contains 16 telemetry points sampled at the same rate that engineering data are collected but output more often than engineering data. The OMPS Dwell Telemetry packet, APID 549, has a fixed length of 244 octets. The structure of APID 549 is illustrated in Figure 4.3-56 and the user data fields are listed in Table 4.3.18.

| OMPS Dwell | . Telemetry | RDR               |                 |             |                            |                   |        |                  |                           |     |                | VERSION             | 6.6       | D            | DATE:          | 10/12/2004    |                  |        |                  |        |             |       |
|------------|-------------|-------------------|-----------------|-------------|----------------------------|-------------------|--------|------------------|---------------------------|-----|----------------|---------------------|-----------|--------------|----------------|---------------|------------------|--------|------------------|--------|-------------|-------|
|            |             |                   | PACKE'          | T PRIMARY H | HEADER                     |                   |        | SECONDARY HEADER |                           |     |                |                     |           |              |                | User Dat      | a Field          |        |                  |        |             |       |
|            | Verson No.  | Packe             | t Identific     | cation      | Packet                     | Sequence          | Packet | Start of         | Start of Packets in Spare |     |                | OMPS Header         |           |              | Dwell Point #1 |               |                  |        | Dwell Point 2-15 |        |             |       |
|            |             | Type<br>Indicator | Sec Hdr<br>Flag | APID        | Sequence<br>Flags          | Sequence<br>Count | Length | Scan             | RDR<br>-1                 |     | RDR<br>Version | Cont<br>Count<br>-1 | Cont Flag | DWL_01_TBL D | OWL_01_OF      | F DWL_01_ADDR | DWL_01_VALU<br>E | DW     | 5_##_****        |        | DWL_16_**** | TOTAL |
| Bits       | 3           | 1                 | 1               | 11          | 2                          | 14                | 16     | 64               | 8                         | 8   | 16             | 8                   | 8         | 16           | 32             | 32            | 32               |        | 1568             |        | 112         | 1952  |
| Octets     |             |                   | 2               |             |                            | 2                 | 2      | 8                | 1                         | 1   | 2              | 1                   | 1         | 2            | 4              | 4             | 4                |        | 196              |        | 14          | 244   |
| Value      | 000         | , 0               | 1 、             | 0x225       | 11                         | varies            | 0x00ED | varies           | varies                    | 0x0 | varies         | varies              | varies    | varies       | varies         | varies        | varies           | varies | varies           | varies | varies      |       |
|            |             | Telen             | netry Packet    |             | Secondary<br>Header Presen | t                 |        |                  |                           |     |                |                     |           |              |                |               |                  |        |                  |        |             |       |

# Figure 4.3-56 OMPS Dwell Packet Format

| 0         16         CCSDS.RD. VER.         Wergin Number of RDR         NA         NA         NA           16         8         CCSDS.CONT_COUNT         Number of segmented CSDS packt sequences - 1         NA         NA         NA           24         8         CCSDS.CONT_FLAG         Indicates (ffine CCSDS packt sequences - 1         NA         NA         NA           24         8         CCSDS.CONT_FLAG         Dowl Point #1 Table (BD         NA         NA         NA           48         32         DWL.01 (DFRSET         Dowl Point #1 Table (BC Othel         NA         NA         NA         NA           111         32         DWL.01 (DR         Deell Point #1 Table (BC Othel         NA         NA         NA         NA           112         2         DWL.01 (ADR         Deell Point #1 Table (BC Othel         NA         NA         NA         NA           113         32         DWL.02 (APRST         Deell Point #1 Table (BC Othel         NA         NA         NA         NA           114         32         DWL.02 (ADR         Deell Point #1 Table (BC Othel         NA         NA         NA           112         32         DWL.03 (ADR         Deell Point #1 Table (BC Othel         NA         NA            | Start Bit | Bit<br>Size | Mnemonic Name    | Description                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|------------------|------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 16         8         CCSDS_CONT_COUNT         Number of segmented CCSDS packet segmences - 1         NA         NA         NA           24         8         CCSDS_CONT_FLAG         Indicates if the CCSDS packet begins an RDR         NA         NA         NA         NA           32         16         DWL 01 CFSET         Devel Point #1 Table Byte Offset         NA         NA         NA         NA           80         22         DWL 01 ADDR         Devel Point #1 Table Byte Offset         NA         NA         NA         NA           112         12         DWL 01 ADDR         Devel Point #1 Table Byte Offset         NA         NA         NA         NA           114         16         DWL 02 ADDR         Devel Point #2 Table Byte Offset         NA         NA         NA         NA           114         16         DWL 02 ADDR         Devel Point #2 Table Byte Offset         NA         NA         NA         NA           112         23         DWL 02 ADDR         Devel Point #2 NAM Address         NA         NA         NA         NA           113         23         DWL 02 ADDR         Devel Point #2 NAM Address         NA         NA         NA           114         24         DWL 02 ADDR         Devel         | 0         | 16          | CCSDS_RDR_VER    | Version Number of RDR                          | N/A                        | N/A                                                                        | U         |
| 24         8         CCSDS_CONT_FLAG         Indicate if this CCSDS goals         N/A         N/A         N/A           22         16         DWL 01 TBL ID         Dwell Point #1 Table ID         N/A         N/A         N/A           48         32         DWL 01 OFFSET         Dwell Point #1 RAM Address         N/A         N/A         N/A           112         32         DWL 01 ODR         Dwell Point #1 RAM Address         N/A         N/A         N/A           112         32         DWL 02 TBL ID         Dwell Point #1 RAM Address         N/A         N/A         N/A           112         32         DWL 02 OFFSET         Dwell Point #2 RAM Address         N/A         N/A         N/A           120         32         DWL 02 OFFSET         Dwell Point #2 RAM Address         N/A         N/A         N/A           224         32         DWL 02 ADDR         Dwell Point #3 Table ID         N/A         N/A         N/A           324         32         DWL 03 OFFSET         Dwell Point #3 Table ID         N/A         N/A         N/A           336         12         DWL 03 OFFSET         Dwell Point #3 Table ID         N/A         N/A         N/A           336         16         DWL 04 OADR                         | 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1 | N/A                        | N/A                                                                        | U         |
| 32         16         DVU, 01 TBL, ID         Deel Point #T Table DVC Offset         N/A         N/A         N/A           86         32         DVU, 01 ADDR         Dvell Point #T Table BVC Offset         N/A         N/A         N/A           80         32         DVU, 01 ADDR         Dvell Point #T Value         N/A         N/A         N/A           812         32         DVU, 01 ADDR         Dvell Point #T Value         N/A         N/A         N/A           814         16         DVU, 02 OFTSET         Dvell Point #T Value         N/A         N/A         N/A           816         DVU, 02 ADDR         Dvell Point #Z Table BC Offset         N/A         N/A         N/A           824         32         DVU, 02 ADDR         Dvell Point #Z Table BC         N/A         N/A         N/A           826         16         DVU, 02 ADDR         Dvell Point #Z Value         N/A         N/A         N/A           826         16         DVU, 02 ADDR         Dvell Point #Z Value         N/A         N/A         N/A           826         16         DVU, 02 ADDR         Dvell Point #Z Value         N/A         N/A         N/A           826         16         DVU, 03 OFFSET         Dvell Point #S Table PO<                 | 24        | 8           | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR   | N/A                        | N/A                                                                        | U         |
| 48         32         DVL 01 OFFSET         Dwell Point #1 RAM Adverses         NA         NA         NA           112         32         DVVL 01 VALUE         Dwell Point #1 RAM Adverses         NA         NA         NA           112         32         DVVL 02 TRL 1D         Dwell Point #1 RAM Adverses         NA         NA         NA           112         32         DVVL 02 TRL 1D         Dwell Point #2 Table 1D         NA         NA         NA           112         32         DVVL 02 TRL 1D         Dwell Point #2 Table 1D         NA         NA         NA           112         32         DVVL 02 ADR         Dwell Point #2 Table 1D         NA         NA         NA           224         32         DVVL 03 ADR         Dwell Point #2 Table 1D         NA         NA         NA           324         32         DVVL 03 ADR         Dwell Point #3 Table 1D         NA         NA         NA           336         32         DVVL 03 VALUE         Dwell Point #3 Table 1D         NA         NA         NA           336         32         DVVL 04 TRL 1D         Dwell Point #3 Table 1D         NA         NA         NA           344         32         DVVL 04 ADR         DWell Point #4 Table 1D<                          | 32        | 16          | DWL_01_TBL_ID    | Dwell Point #1 Table ID                        | N/A                        | N/A                                                                        | U         |
| 80     32     DWL 01 / ALDR     Dwell Point #1 AMA ddress     NA     NA     NA       112     32     DWL 01 / ALDE     Dwell Point #2 Table BU     NA     NA     NA       144     16     DWL 02 / CFSFT     Dwell Point #2 Table BUC     NA     NA     NA       150     32     DWL 02 / CFSFT     Dwell Point #2 Table BUC Offset     NA     NA     NA       152     32     DWL 02 / ALDE     Dwell Point #2 Table BUC Offset     NA     NA     NA       152     32     DWL 02 / ALDE     Dwell Point #3 Table BUC Offset     NA     NA     NA       256     16     DWL 03 / CFSFT     Dwell Point #3 Table BUC Offset     NA     NA     NA       364     32     DWL 03 / ALDE     Dwell Point #3 Table BUC Offset     NA     NA     NA       376     32     DWL 04 / TEL ID     Dwell Point #4 Table DUC     NA     NA     NA       378     32     DWL 04 / TEL ID     Dwell Point #4 Table DUC     NA     NA     NA       378     32     DWL 04 / ADL ID     Dwell Point #4 Table DUC     NA     NA     NA       378     32     DWL 04 / ADL ID     Dwell Point #4 Table DUC     NA     NA     NA       378     32     DWL 04 / ADL ID <td>48</td> <td>32</td> <td>DWL_01_OFFSET</td> <td>Dwell Point #1 Table Byte Offset</td> <td>N/A</td> <td>N/A</td> <td>U</td> | 48        | 32          | DWL_01_OFFSET    | Dwell Point #1 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 112       32       DVL Q1 VALUE       Dwell Point #1 Value       N/A       N/A         144       16       DVL Q2 TFSET       Dwell Point #2 Table B/b Offset       N/A       N/A       N/A         150       32       DVL Q2 OFFSET       Dwell Point #2 Table B/b Offset       N/A       N/A       N/A       N/A         224       32       DVL Q2 VALUE       Dwell Point #2 Table B/b Offset       N/A       N/A       N/A       N/A         234       32       DVL Q3 OFFSET       Dwell Point #3 Table B/b Offset       N/A       N/A       N/A       N/A         242       32       DVL Q3 OFFSET       Dwell Point #3 Table B/b Offset       N/A       N/A       N/A       N/A         343       32       DVL Q3 VALUE       Dwell Point #4 Table B/b       N/A       N/A       N/A         358       16       DVL Q4 OFFSET       Dwell Point #4 Table B/b       N/A       N/A       N/A         364       32       DVL Q4 VALUE       Dwell Point #4 Table B/b       N/A       N/A       N/A         376       32       DVL Q4 VALUE       Dwell Point #4 Table B/b       N/A       N/A       N/A         384       32       DVL Q4 VALUE       Dwell Point #4 Table B/b       N/A                                                                           | 80        | 32          | DWL_01_ADDR      | Dwell Point #1 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 14416DWL 02, TBL JDDWEIP OIN #2 Table IDNANANA16032DWL 02, ADRDWEIP OIN #2 TABLe DYE OffsetNANANANA19232DWL 02, ADRDWEIP OIN #2 TABLe DYE OffsetNANANANA19232DWL 03, TBL JDDWEIP OIN #2 YableNANANANANA28616DWL 03, TBL JDDWEIP OIN #3 Table IDNANANANANA30432DWL 03, OFFSETDWEIP OIN #3 TABLe DYE OffsetNANANANA30432DWL 03, ADRDWEIP OIN #3 TABLe DYE OffsetNANANANA30432DWL 04, OFFSETDWEIP OIN #3 Yable DYE OffsetNANANANA38816DWL 04, OFFSETDWEIP OIN #4 Table IDNANANANA38432DWL 04, ADRDWEIP OIN #4 Table IDNANANANA48632DWL 04, ADRDWEIP OIN #4 YableNANANA48632DWL 04, OFFSETDWEIP OIN #5 Table IDNANANANA58032DWL 05, ADRDWEIP OIN #5 YableNANANA58032DWL 05, ADRDWEIP OIN #5 YableNANANA58132DWL 05, ADRDWEIP OIN #5 YableNANANA58216                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 112       | 32          | DWL_01_VALUE     | Dwell Point #1 Value                           | N/A                        | N/A                                                                        | U         |
| 100         32         DVL 02, OFFSET         Dwell Point #2 Table Byte Offset         N/A         N/A         N/A           124         32         DVL 02, VALUE         Dwell Point #2 Value         N/A         N/A         N/A           224         32         DVL 02, VALUE         Dwell Point #3 Table DD         N/A         N/A         N/A           224         32         DVL 03, OFFSET         Dwell Point #3 Table Byte Offset         N/A         N/A         N/A           324         32         DVL 03, OFFSET         Dwell Point #3 Table Byte Offset         N/A         N/A         N/A           336         32         DVL 03, VALUE         Dwell Point #3 Value         N/A         N/A         N/A           388         16         DVL 04, OFFSET         Dwell Point #1 Table Byte Offset         N/A         N/A         N/A           416         32         DVL 04, OFFSET         Dwell Point #4 Table Byte Offset         N/A         N/A         N/A           486         32         DVL 04, OFFSET         Dwell Point #4 Table Byte Offset         N/A         N/A         N/A           486         32         DVL 04, OFFSET         Dwell Point #4 Table Byte Offset         N/A         N/A         N/A           486     | 144       | 16          | DWL_02_TBL_ID    | Dwell Point #2 Table ID                        | N/A                        | N/A                                                                        | U         |
| 192         22         DVL 02 ADDR         Deell Point #2 RAM Address         N/A         N/A         N/A           224         32         DVL 02 AULE         Deell Point #3 Table 10         N/A         N/A         N/A           226         16         DVL 03 TBL 10         Deell Point #3 Table 10         N/A         N/A         N/A           324         32         DVL 03 ADDR         Deell Point #3 Table Byte Offset         N/A         N/A         N/A           336         32         DVL 03 ADDR         Deell Point #4 Table 10         N/A         N/A         N/A           336         32         DVL 03 VALUE         Deell Point #4 Table 10         N/A         N/A         N/A           336         32         DVL 04 OFFSET         Deell Point #4 Table 10         N/A         N/A         N/A           344         32         DVL 04 ADDR         Deell Point #4 Table 10         N/A         N/A         N/A           448         32         DVL 04 VALUE         Deell Point #5 Table 10         N/A         N/A           458         32         DVL 05 OFFSET         Deell Point #5 Table 10         N/A         N/A           560         32         DVL 05 VALUE         Deell Point #6 Table 10         N/A                 | 160       | 32          | DWL_02_OFFSET    | Dwell Point #2 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 224         32         DWL 02 VALUE         Dwell Point #3 Table D         N/A         N/A         N/A           256         16         DWL 03 OFFSET         Dwell Point #3 Table DD         N/A         N/A         N/A           304         32         DWL 03 OFFSET         Dwell Point #3 Table DV         N/A         N/A         N/A           304         32         DWL 03 VALUE         Dwell Point #3 Table DV         N/A         N/A         N/A           305         32         DWL 04 OTBL D         Dwell Point #3 Table DV         N/A         N/A         N/A           308         32         DWL 04 OFFSET         Dwell Point #1 Table DV         N/A         N/A         N/A           304         32         DWL 04 ADDR         Dwell Point #4 Table DV         N/A         N/A         N/A           416         DWL 04 ADDR         Dwell Point #1 Table DV         N/A         N/A         N/A           420         16         DWL 04 ADDR         Dwell Point #1 Table DV         N/A         N/A         N/A           430         16         DWL 05 TBL D         Dwell Point #5 Table D         N/A         N/A         N/A           430         16         DWL 05 GADR         Dwell Point #5 Table DV                            | 192       | 32          | DWL_02_ADDR      | Dwell Point #2 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 256         16         DWL 03 TBL ID         Dwell Point #3 Table JD         NA         NA         NA           372         32         DWL 03 ADDR         Dwell Point #3 Table Byto Offset         NA         NA         NA         NA           384         32         DWL 03 ADDR         Dwell Point #3 Table Byto Offset         NA         NA         NA         NA           386         16         DWL 04 TBL ID         Dwell Point #4 Table Byto Offset         NA         NA         NA         NA           384         32         DWL 04 OFFSET         Dwell Point #4 Table Byto Offset         NA         NA         NA         NA           384         32         DWL 04 OFFSET         Dwell Point #4 Table Byto Offset         NA         NA         NA         NA           416         32         DWL 04 VALUE         Dwell Point #5 Table Byto Offset         NA         NA         NA         NA           480         16         DUVL 05 OFFSET         Dwell Point #5 Table Byto Offset         NA         NA         NA         NA           480         16         DUVL 05 OFFSET         Dwell Point #5 Table Byto Offset         NA         NA         NA         NA           581         32         DWL 05 VALUE                      | 224       | 32          | DWL_02_VALUE     | Dwell Point #2 Value                           | N/A                        | N/A                                                                        | U         |
| 212         32         DWL 03 OFFSET         Dwell Point #3 Table Byte Offset         NA         NA         NA           336         32         DWL 03 ADDR         Dwell Point #3 Table Byte Offset         NA         NA         NA           386         16         DWL 04 TBL, ID         Dwell Point #3 Table Byte Offset         NIA         NIA         NIA           386         16         DWL 04 TBL, ID         Dwell Point #4 Table ID         NIA         NIA         NIA           384         32         DWL 04 ADDR         Dwell Point #4 Table PO         NIA         NIA         NIA           416         32         DWL 04 ADDR         Dwell Point #4 Table PO         NIA         NIA         NIA           488         32         DWL 04 ADDR         Dwell Point #4 Table PO         NIA         NIA         NIA           480         16         DWL 05 TBL, ID         Dwell Point #5 Table PO         NIA         NIA         NIA           583         32         DWL 05 ADDR         Dwell Point #5 Table PO         NIA         NIA         NIA           592         16         DWL 05 ADDR         Dwell Point #5 Table PO         NIA         NIA         NIA           680         32         DWL 06 GFSET                         | 256       | 16          | DWL_03_TBL_ID    | Dwell Point #3 Table ID                        | N/A                        | N/A                                                                        | U         |
| 30432DWL 03 ADDRDwell Point #3 RAM AddressN/ANANA33632DWL 04 TBL IDDwell Point #3 ValueN/AN/AN/AN/A34432DWL 04 OFFSETDwell Point #4 Table Byte OffsetN/AN/AN/AN/A34432DWL 04 ADDRDwell Point #4 Table Byte OffsetN/AN/AN/AN/A41632DWL 04 ADDRDwell Point #4 ValueN/AN/AN/AN/A48016DWL 05 OFFSETDwell Point #4 ValueN/AN/AN/A48016DWL 05 OFFSETDwell Point #5 Table DN/AN/AN/A48032DWL 05 OFFSETDwell Point #5 Table DN/AN/AN/A58132DWL 05 OFFSETDwell Point #5 Table DN/AN/AN/A58232DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/A58332DWL 06 ADDRDwell Point #5 Table Byte OffsetN/AN/AN/A58432DWL 06 ADDRDwell Point #5 Table Byte OffsetN/AN/AN/A58532DWL 06 ADDRDwell Point #6 ValueN/AN/AN/A64032DWL 06 ADDRDwell Point #6 AddressN/AN/AN/A64132DWL 06 VALUEDwell Point #6 ValueN/AN/AN/A64232DWL 06 VALUEDwell Point #6 AddressN/AN/AN/A64332<                                                                                                                                                                                                                                                                                                                                                                                                          | 272       | 32          | DWL_03_OFFSET    | Dwell Point #3 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 332         DWL 03 VALUE         Dwell Point #3 Value         NA         NA         NA           388         16         DWL 04 TBL ID         Dwell Point #4 Table D         NA         NA         NA           384         32         DWL 04 OFFSET         Dwell Point #4 Table D         NA         NA         NA         NA           416         32         DWL 04 ADDR         Dwell Point #4 Table D         NA         NA         NA         NA           416         32         DWL 04 VALUE         Dwell Point #4 Yalue         NA         NA         NA         NA           480         16         DWL 05 TBL ID         Dwell Point #5 Table D         NA         NA         NA         NA           490         16         DWL 05 OFFSET         Dwell Point #5 Table Pite 976 ffset         NA         NA         NA           581         32         DWL 05 ADDR         Dwell Point #5 Table Yalue         NA         NA         NA           582         16         DWL 06 TBL ID         Dwell Point #6 Table ID         NA         NA         NA           582         16         DWL 06 OFFSET         Dwell Point #6 Table ID         NA         NA         NA           608         32         DWL                                            | 304       | 32          | DWL_03_ADDR      | Dwell Point #3 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 38816DWL 04 TBL IDDwell Point #4 Table IDN/AN/AN/A38432DWL 04 OFFSETDwell Point #4 RAM AddressN/AN/AN/AN/A41632DWL 04 ADDRDwell Point #4 RAM AddressN/AN/AN/AN/A44832DWL 04 VALUEDwell Point #4 ValueN/AN/AN/AN/A48016DWL 05 TBL IDDwell Point #5 Table IDN/AN/AN/AN/A49632DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/AN/A52832DWL 05 ADDRDwell Point #5 Table Byte OffsetN/AN/AN/AN/A56032DWL 06 TBL IDDwell Point #5 Table Byte OffsetN/AN/AN/A56216DWL 06 TBL IDDwell Point #5 Table DLN/AN/AN/A56332DWL 06 OFFSETDwell Point #6 Table DLN/AN/AN/A56432DWL 06 TBL IDDwell Point #6 Table DLN/AN/AN/A57232DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/A67232DWL 06 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A72416DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A72532DWL 07 ADDRDwell Point #7 Table Byte Offset <t< td=""><td>336</td><td>32</td><td>DWL_03_VALUE</td><td>Dwell Point #3 Value</td><td>N/A</td><td>N/A</td><td>U</td></t<>                                                                                                                                                                                                                                                                                          | 336       | 32          | DWL_03_VALUE     | Dwell Point #3 Value                           | N/A                        | N/A                                                                        | U         |
| 38432DWL 04 OFFSETDwell Point #4 Table Byte OffsetN/AN/AN/A41632DWL 04 ADRDwell Point #4 RAM AddressN/AN/AN/AN/A48016DWL 05 TBL IDDwell Point #5 Table IDN/AN/AN/AN/A49016DWL 05 OFFSETDwell Point #5 Table IDN/AN/AN/AN/A52832DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/AN/A56032DWL 05 VALUEDwell Point #5 ValueN/AN/AN/AN/A56032DWL 06 TBL IDDwell Point #6 Table Byte OffsetN/AN/AN/A60832DWL 06 TBL IDDwell Point #6 Table Byte OffsetN/AN/AN/A64032DWL 06 VALUEDwell Point #6 Table Byte OffsetN/AN/AN/A64132DWL 06 VALUEDwell Point #6 Table Byte OffsetN/AN/AN/A64232DWL 06 VALUEDwell Point #6 Table Byte OffsetN/AN/AN/A70416DWL 07 TBL IDDwell Point #7 Table IDN/AN/AN/A72032DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 VALUEDwell Point #7 Table IDN/AN/AN/A78432DWL 07 ADDRDevell Point #7 Table IDN/AN/A                                                                                                                                                                                                                                                                                                                                                                                                              | 368       | 16          | DWL_04_TBL_ID    | Dwell Point #4 Table ID                        | N/A                        | N/A                                                                        | U         |
| 41632DWL 04 ADDRDwell Point #4 AMA AddressN/AN/AN/A44832DWL 05 TBL IDDwell Point #4 ValueN/AN/AN/A48016DWL 05 TBL IDDwell Point #5 Table IDN/AN/AN/A49632DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/A52832DWL 05 ADDRDwell Point #5 RAM AddressN/AN/AN/A58032DWL 06 OFFSETDwell Point #5 ValueN/AN/AN/A59216DWL 06 TBL IDDwell Point #6 Table Byte OffsetN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/A61032DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/A67232DWL 06 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A67232DWL 06 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A70416DWL 07 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/A72032DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A74432DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A74432DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A74432DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A <t< td=""><td>384</td><td>32</td><td>DWL_04_OFFSET</td><td>Dwell Point #4 Table Byte Offset</td><td>N/A</td><td>N/A</td><td>U</td></t<>                                                                                                                                                                                                          | 384       | 32          | DWL_04_OFFSET    | Dwell Point #4 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 44832DWL 04 VALUEDwell Point #4 ValueN/AN/AN/A48016DWL 05 TBL IDDwell Point #5 Table IDN/AN/AN/AN/A49632DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/AN/A52832DWL 05 ADDRDwell Point #5 RAM AddressN/AN/AN/AN/A56032DWL 05 VALUEDwell Point #5 ValueN/AN/AN/AN/A59216DWL 06 TBL IDDwell Point #5 Table IDN/AN/AN/AN/A60832DWL 06 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/A64032DWL 06 ADDRDwell Point #6 Table IDN/AN/AN/A67232DWL 06 VALUEDwell Point #6 ValueN/AN/AN/A70416DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A72032DWL 07 ADDRDwell Point #7 RAM AddressN/AN/AN/A74432DWL 07 ADDRDwell Point #7 RAM AddressN/AN/AN/A78432DWL 07 ADDRDwell Point #7 RAM AddressN/AN/AN/A78432DWL 07 ADDRDwell Point #7 RAM AddressN/AN/AN/A81616DWL 08 TBL IDDwell Point #7 RAM AddressN/AN/AN/A82632DWL 08 OFFSET </td <td>416</td> <td>32</td> <td>DWL_04_ADDR</td> <td>Dwell Point #4 RAM Address</td> <td>N/A</td> <td>N/A</td> <td>U</td>                                                                                                                                                                                                                                                                                                      | 416       | 32          | DWL_04_ADDR      | Dwell Point #4 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 48016DWL 05 TBL IDDwell Point #5 Table IDN/AN/AN/A49632DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/AN/A52832DWL 05 VALUEDwell Point #5 RAM AddressN/AN/AN/AN/A56032DWL 05 VALUEDwell Point #5 RAM AddressN/AN/AN/AN/A59216DWL 06 TBL IDDwell Point #6 Table Byte OffsetN/AN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 RAM AddressN/AN/AN/AN/A64032DWL 06 ADDRDwell Point #6 RAM AddressN/AN/AN/AN/A67232DWL 06 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/AN/A67416DWL 07 TBL IDDwell Point #7 Table IDN/AN/AN/AN/A72032DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A81616DWL 08 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A82332DWL 08 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A84432DWL 08 OFFSETDwell Point #8 Table Byte OffsetN/AN/A <td>448</td> <td>32</td> <td>DWL_04_VALUE</td> <td>Dwell Point #4 Value</td> <td>N/A</td> <td>N/A</td> <td>U</td>                                                                                                                                                                                                                                                            | 448       | 32          | DWL_04_VALUE     | Dwell Point #4 Value                           | N/A                        | N/A                                                                        | U         |
| 49632DWL 05 OFFSETDwell Point #5 Table Byte OffsetN/AN/AN/A52832DWL 05 VALUEDwell Point #5 RAM AddressN/AN/AN/AN/A52032DWL 05 VALUEDwell Point #5 ValueN/AN/AN/AN/A59216DWL 06 TBL IDDwell Point #6 Table IDN/AN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/AN/A61032DWL 06 ADRDwell Point #6 Table Byte OffsetN/AN/AN/AN/A61232DWL 06 VALUEDwell Point #6 ValueN/AN/AN/AN/A61412DWL 07 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/AN/A70416DWL 07 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/A71232DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A72032DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/A73132DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A74432DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/A74432DWL 07 ADDRDwell Point #7 Table IDN/AN/AN/A75232DWL 07 ADDRDwell Point #7 Table IDN/AN/A75                                                                                                                                                                                                                                                                                                                                                                                                              | 480       | 16          | DWL_05_TBL_ID    | Dwell Point #5 Table ID                        | N/A                        | N/A                                                                        | U         |
| 52832DWL 05 ADDRDwell Point #5 RAM AddressN/AN/AN/A56032DWL 05 VALUEDwell Point #5 ValueN/AN/AN/AN/A59216DWL 06 TBL IDDwell Point #6 Table IDN/AN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/AN/A64032DWL 06 ADDRDwell Point #6 Table Byte OffsetN/AN/AN/AN/A67232DWL 06 VALUEDwell Point #6 ValueN/AN/AN/AN/A70416DWL 07 TBL IDDwell Point #7 Table IDN/AN/AN/AN/A72032DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 ADDRDwell Point #7 ValueN/AN/AN/A78432DWL 07 ALUEDwell Point #7 Table IDN/AN/AN/A81616DWL 08 TBL IDDwell Point #7 Table IDN/AN/AN/A82232DWL 08 OFFSETDwell Point #7 Table IDN/AN/AN/A83232DWL 08 ADRDwell Point #7 Table Byte OffsetN/AN/AN/A84432DWL 08 OFFSETDwell Point #8 Table Byte OffsetN/AN/AN/A84632DWL 08 ADRDwell Point #8 Table Byte OffsetN/AN/AN/A84632D                                                                                                                                                                                                                                                                                                                                                                                                                                | 496       | 32          | DWL_05_OFFSET    | Dwell Point #5 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 56032DWL 05 VALUEDwell Point #5 ValueN/AN/AN/A59216DWL 06 DFFSETDwell Point #6 Table IDN/AN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/AN/A64032DWL 06 ADDRDwell Point #6 Table Byte OffsetN/AN/AN/AN/A67232DWL 06 ADDRDwell Point #6 ValueN/AN/AN/AN/A70416DWL 07 TBL IDDwell Point #7 Table IDN/AN/AN/AN/A72032DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/AN/A75232DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 VALUEDwell Point #7 ValueN/AN/AN/A81616DWL 08 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/A83232DWL 08 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A86432DWL 08 ADDRDwell Point #8 Table Byte OffsetN/AN/AN/A89632DWL 08 VALUEDwell Point #8 Table Byte OffsetN/AN/AN/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 528       | 32          | DWL_05_ADDR      | Dwell Point #5 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 59216DWL 06 TBL IDDwell Point #6 Table IDN/AN/AN/A60832DWL 06 OFFSETDwell Point #6 Table Byte OffsetN/AN/AN/A64032DWL 06 ADDRDwell Point #6 Table Byte OffsetN/AN/AN/A67232DWL 06 VALUEDwell Point #6 ValueN/AN/AN/A67416DWL 07 TBL IDDwell Point #7 Table IDN/AN/AN/A72032DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A75232DWL 07 ADDRDwell Point #7 Table Byte OffsetN/AN/AN/A76432DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A75432DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A78432DWL 07 VALUEDwell Point #7 Table Byte OffsetN/AN/AN/A81616DWL 08 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/A83232DWL 08 OFFSETDwell Point #8 Table Byte OffsetN/AN/AN/A84632DWL 08 ADDRDwell Point #8 RAM AddressN/AN/AN/A84632DWL 08 VALUEDwell Point #8 ValueN/AN/AN/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 560       | 32          | DWL_05_VALUE     | Dwell Point #5 Value                           | N/A                        | N/A                                                                        | U         |
| 608       32       DWL 06 OFFSET       Dwell Point #6 Table Byte Offset       N/A       N/A       N/A         640       32       DWL 06 ADDR       Dwell Point #6 RAM Address       N/A       N/A       N/A         640       32       DWL 06 VALUE       Dwell Point #6 Value       N/A       N/A       N/A         672       32       DWL 07 AVUE       Dwell Point #7 Table ID       N/A       N/A       N/A         704       16       DWL 07 TBL ID       Dwell Point #7 Table Byte Offset       N/A       N/A       N/A         720       32       DWL 07 ADDR       Dwell Point #7 Table Byte Offset       N/A       N/A       N/A         752       32       DWL 07 ADDR       Dwell Point #7 Table Byte Offset       N/A       N/A       N/A         784       32       DWL 07 VALUE       Dwell Point #7 Table ID       N/A       N/A       N/A         816       16       DWL 08 TBL ID       Dwell Point #7 Table ID       N/A       N/A       N/A         832       32       DWL 08 OFFSET       Dwell Point #7 Table ID       N/A       N/A       N/A         844       32       DWL 08 OFFSET       Dwell Point #8 Table Byte Offset       N/A       N/A       N/A                                                                                     | 592       | 16          | DWL_06_TBL_ID    | Dwell Point #6 Table ID                        | N/A                        | N/A                                                                        | U         |
| 64032DWL 06 ADDRDwell Point #6 RAM AddressN/ANAANA67232DWL 06 VALUEDwell Point #6 ValueN/AN/AN/AN/A70416DWL 07 TBL IDDWell Point #7 Table IDN/AN/AN/A72032DWL 07 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A75232DWL 07 ADDRDwell Point #7 RAM AddressN/AN/AN/A78432DWL 07 VALUEDwell Point #7 Table IDN/AN/AN/A81616DWL 08 TBL IDDwell Point #7 Table Byte OffsetN/AN/AN/A83232DWL 08 OFFSETDwell Point #7 Table Byte OffsetN/AN/AN/A86432DWL 08 ADDRDwell Point #8 RAM AddressN/AN/AN/A89632DWL 08 VALUEDwell Point #8 RAM AddressN/AN/AN/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 608       | 32          | DWL_06_OFFSET    | Dwell Point #6 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 672       32       DWL 06, VALUE       Dwell Point #0 Value       N/A       N/A       N/A         704       16       DWL 07, TBL ID       Dwell Point #7 Table ID       N/A       N/A       N/A         720       32       DWL 07, OFFSET       Dwell Point #7 Table Byte Offset       N/A       N/A       N/A         752       32       DWL 07, ADDR       Dwell Point #7 Table Byte Offset       N/A       N/A       N/A         764       32       DWL 07, VALUE       Dwell Point #7 Value       N/A       N/A       N/A         784       32       DWL 07, VALUE       Dwell Point #7 Value       N/A       N/A       N/A         816       16       DWL 08 OFFSET       Dwell Point #8 Table Byte Offset       N/A       N/A       N/A         832       32       DWL 08 OFFSET       Dwell Point #8 RAM Address       N/A       N/A       N/A         846       32       DWL 08 VL 08 VLE       Dwell Point #8 Value       N/A       N/A       N/A                                                                                                                                                                                                                                                                                                            | 640       | 32          | DWL_06_ADDR      | Dwell Point #6 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 704         16         DWL 07 TBL ID         Dwell Point #7 Table ID         N/A         NAA         NA           720         32         DWL 07 OFFSET         Dwell Point #7 Table Byte Offset         N/A         N/A         N/A         N/A         N/A           752         32         DWL 07 ADDR         Dwell Point #7 Table Byte Offset         N/A                                             | 672       | 32          | DWL_06_VALUE     | Dwell Point #6 Value                           | N/A                        | N/A                                                                        | U         |
| 720         32         DWL 07_OFFSET         Dwell Point #7 Table Byte Offset         N/A         N/A         N/A           752         32         DWL 07_OADR         Dwell Point #7 Table Byte Offset         N/A         N/A         N/A         N/A           784         32         DWL 07_VALUE         Dwell Point #7 Value         N/A         N/A         N/A         N/A           816         16         DWL 08_TBL_1D         Dwell Point #7 Table Byte Offset         N/A         N/A         N/A           832         32         DWL 08_OFFSET         Dwell Point #7 Table Byte Offset         N/A         N/A         N/A           864         32         DWL 08_ADDR         Dwell Point #8 RAM Address         N/A         N/A         N/A           896         32         DWL 08_VLUE         Dwell Point #8 Value         N/A         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                          | 704       | 16          | DWL_07_TBL_ID    | Dwell Point #7 Table ID                        | N/A                        | N/A                                                                        | U         |
| 752         32         DWL 07. ADDR         Dwell Point #7. RAM Address         N/A         N/A         N/A           784         32         DWL 07. VALUE         Dwell Point #7. Value         N/A         N/A         N/A         N/A           816         16         DWL 08. TBL ID         Dwell Point #7. Table ID         N/A         N/A         N/A           832         32         DWL 08 OFFSET         Dwell Point #8. Table Byte Offset         N/A         N/A         N/A           864         32         DWL 08 ADDR         Dwell Point #8. RAM Address         N/A         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 720       | 32          | DWL_07_OFFSET    | Dwell Point #7 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 784         32         DWL 07_VALUE         Dwell Point #7 Value         N/A         N/A           816         16         DWL 08_TBL_ID         Dwell Point #8 Table ID         N/A         N/A         N/A           832         32         DWL 08_OFFSET         Dwell Point #8 Table Byte Offset         N/A         N/A         N/A           846         32         DWL 08_ADDR         Dwell Point #8 RAM Address         N/A         N/A         N/A           896         32         DWL 08_VLUE         Dwell Point #8 Value         N/A         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 752       | 32          | DWL_07_ADDR      | Dwell Point #7 RAM Address                     | N/A                        | N/A                                                                        | U         |
| 816         16         DWL_08_TBL_ID         Dwell Point #8 Table ID         N/A         N/A           832         32         DWL_08_OFFSET         Dwell Point #8 Table Byte Offset         N/A         N/A         N/A           864         32         DWL_08_ADDR         Dwell Point #8 RAM Address         N/A         N/A         N/A           896         32         DWL 08 VLUE         Dwell Point #8 Value         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 784       | 32          | DWL_07_VALUE     | Dwell Point #7 Value                           | N/A                        | N/A                                                                        | U         |
| 832         32         DWL 08 OFFSET         Dwell Point #8 Table Byte Offset         N/A         N/A           864         32         DWL 08 ADDR         Dwell Point #8 RAM Address         N/A         N/A         N/A           896         32         DWL 08 VALUE         Dwell Point #8 Value         N/A         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 816       | 16          | DWL_08_TBL_ID    | Dwell Point #8 Table ID                        | N/A                        | N/A                                                                        | U         |
| 864         32         DWL 08_ADDR         Dwell Point #8 RAM Address         N/A         N/A           896         32         DWL 08_VALUE         Dwell Point #8 Value         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 832       | 32          | DWL_08_OFFSET    | Dwell Point #8 Table Byte Offset               | N/A                        | N/A                                                                        | U         |
| 896 32 DWL 08 VALUE Dwell Point #8 Value N/A N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 864       | 32          | DWL_08_ADDR      | Dwell Point #8 RAM Address                     | N/A                        | N/A                                                                        | U         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 896       | 32          | DWL_08_VALUE     | Dwell Point #8 Value                           | N/A                        | N/A                                                                        | U         |

# Table 4.3.18 OMPS Dwell Packet User Data Fields

Dwell Point #8 V

#### Table 4.3.18 OMPS Dwell Packet User Data Fields (cont)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|-----------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 928       | 16          | DWL_09_TBL_ID | Dwell Point #9 Table ID           | N/A                        | N/A                                                                        | U         |
| 944       | 32          | DWL_09_OFFSET | Dwell Point #9 Table Byte Offset  | N/A                        | N/A                                                                        | U         |
| 976       | 32          | DWL_09_ADDR   | Dwell Point #9 RAM Address        | N/A                        | N/A                                                                        | U         |
| 1008      | 32          | DWL_09_VALUE  | Dwell Point #9 Value              | N/A                        | N/A                                                                        | U         |
| 1040      | 16          | DWL_10_TBL_ID | Dwell Point #10 Table ID          | N/A                        | N/A                                                                        | U         |
| 1056      | 32          | DWL_10_OFFSET | Dwell Point #10 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1088      | 32          | DWL_10_ADDR   | Dwell Point #10 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1120      | 32          | DWL_10_VALUE  | Dwell Point #10 Value             | N/A                        | N/A                                                                        | U         |
| 1152      | 16          | DWL_11_TBL_ID | Dwell Point #11 Table ID          | N/A                        | N/A                                                                        | U         |
| 1168      | 32          | DWL_11_OFFSET | Dwell Point #11 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1200      | 32          | DWL_11_ADDR   | Dwell Point #11 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1232      | 32          | DWL_11_VALUE  | Dwell Point #11 Value             | N/A                        | N/A                                                                        | U         |
| 1264      | 16          | DWL_12_TBL_ID | Dwell Point #12 Table ID          | N/A                        | N/A                                                                        | U         |
| 1280      | 32          | DWL_12_OFFSET | Dwell Point #12 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1312      | 32          | DWL_12_ADDR   | Dwell Point #12 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1344      | 32          | DWL_12_VALUE  | Dwell Point #12 Value             | N/A                        | N/A                                                                        | U         |
| 1376      | 16          | DWL_13_TBL_ID | Dwell Point #13 Table ID          | N/A                        | N/A                                                                        | U         |
| 1392      | 32          | DWL_13_OFFSET | Dwell Point #13 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1424      | 32          | DWL_13_ADDR   | Dwell Point #13 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1456      | 32          | DWL_13_VALUE  | Dwell Point #13 Value             | N/A                        | N/A                                                                        | U         |
| 1488      | 16          | DWL_14_TBL_ID | Dwell Point #14 Table ID          | N/A                        | N/A                                                                        | U         |
| 1504      | 32          | DWL_14_OFFSET | Dwell Point #14 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1536      | 32          | DWL_14_ADDR   | Dwell Point #14 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1568      | 32          | DWL_14_VALUE  | Dwell Point #14 Value             | N/A                        | N/A                                                                        | U         |
| 1600      | 16          | DWL_15_TBL_ID | Dwell Point #15 Table ID          | N/A                        | N/A                                                                        | U         |
| 1616      | 32          | DWL_15_OFFSET | Dwell Point #15 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1648      | 32          | DWL_15_ADDR   | Dwell Point #15 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1680      | 32          | DWL_15_VALUE  | Dwell Point #15 Value             | N/A                        | N/A                                                                        | U         |
| 1712      | 16          | DWL_16_TBL_ID | Dwell Point #16 Table ID          | N/A                        | N/A                                                                        | U         |
| 1728      | 32          | DWL_16_OFFSET | Dwell Point #16 Table Byte Offset | N/A                        | N/A                                                                        | U         |
| 1760      | 32          | DWL_16_ADDR   | Dwell Point #16 RAM Address       | N/A                        | N/A                                                                        | U         |
| 1792      | 32          | DWL_16_VALUE  | Dwell Point #16 Value             | N/A                        | N/A                                                                        | U         |

R Dwell Point #16 RAM Address
JE
Dwell Point #16 Value

### 4.3.7.12 Memory Dump

Upon command, the OMPS outputs up to 4 Mbytes of either volatile (RAM) or non-volatile (Flash) memory (NVM). The "Packets in RDR" field in the grouped packet secondary header is an 8 bit field and therefore limits the number of CCSDS packets in a group to 256. See the X-band Data Format ICD and the 1553 Interface Requirements for NPOESS for more information. Therefore, the maximum memory or table data that can be dumped in a grouped packet is 260594 octets. It will take 17 grouped packets (4,219,290 bytes including all headers) to dump the maximum 4,194,304 bytes of memory. For dumps large enough to require multiple grouped packets, the "Cont Count" field indicates the number of *grouped* packets (-1) remaining in the dump. The timestamp in the secondary header represents the time the first packet is generated. If multiple grouped packets are required, the first packet of each group contains a timestamp identical to the first packet. The structure of APID 556 is illustrated in Figure 4.3-57 to Figure 4.3-60 for the first packet of the first grouped packet, the middle and last of the grouped packets and the first packet of any but the first group of packets. The user data fields are listed in Table 4.3.19.

|        |                       |                       |         |           |                 |          |        |          |                  |       | V           |                 |           |            |           |            | -    |
|--------|-----------------------|-----------------------|---------|-----------|-----------------|----------|--------|----------|------------------|-------|-------------|-----------------|-----------|------------|-----------|------------|------|
|        | PACKET PRIMARY HEADER |                       |         |           |                 |          |        |          | SECONDARY HEADER |       |             | User Data Field |           |            |           |            |      |
|        | Verson<br>No.         | Packet Identification |         |           | Packet Sequence |          | Packet | Start of | Packets in       | Spare | OMPS Header |                 | Sensor_In | Table_Dump | Memory or |            |      |
|        |                       | Туре                  | Sec Hdr | APID      | Sequence        | Sequence | Length | Scan     | RDR              |       | RDR         | Cont            | Cont Flag | fo (7)     | (74)      | Table Data |      |
|        |                       | Indicator             | Flag    |           | Flags           | Count    |        |          |                  |       | Version     | Count           |           |            |           |            |      |
|        |                       |                       |         |           |                 |          |        |          |                  |       |             | -1              |           |            |           |            | TOTA |
| Bits   | 3                     | 1                     | 1       | 11        | 2               | 14       | 16     | 64       | 8                | 8     | 16          | 8               | 8         | 64         | 88        | 7880       | 8192 |
| Octets | 2                     |                       |         |           | 2               |          | 2      | 8        | 1                | 1     | 2           | 1               | 1         | 8          | 11        | 985        | 1024 |
| Value  | 000                   | , 0                   | 1       | 0x22C     | 01              | varies   | varies | varies   | varies           | 0x0   | varies      | varies          | varies    | varies     | varies    | varies     |      |
| -      |                       |                       | ,       | $\langle$ |                 |          |        | 30       |                  |       |             |                 |           |            |           |            | -    |
|        |                       | \                     |         |           |                 | ٦        |        |          |                  |       |             |                 |           |            |           |            |      |



# Figure 4.3-57 OMPS First Grouped Memory/Table Dump First Packet Format
MIDDLE PACKET Qty. up to 254

|      |             |                   | PACKE                 | T PRIMARY | HEADER            |                        |           | User Data Field                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |       |
|------|-------------|-------------------|-----------------------|-----------|-------------------|------------------------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|
| - F  | Verson      | Packe             | Packet Identification |           | Packet            | Packet Sequence Packet |           | Table/Memory Dump                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |       |
|      | No.         | Type<br>Indicator | Sec Hdr<br>Flag       | APID      | Sequence<br>Flags | Sequence<br>Count      | Length    | Table/Memory data<br>(middle)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | TOTAL |
| its  | 3           | 1                 | 1                     | 11        | 2                 | 14                     | 16        | 8144                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 8192  |
| ets  |             | 2                 | 2                     |           | 2                 |                        | 2         | 1018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 1024  |
| lue  | 000         | 0 /               | 0                     | 0x22C     | 00                | varies                 | 0x3F9     | varies                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |       |
| Tele | emetry Pack | et                |                       |           |                   | Midd                   | le Packet | and the second se |       |

## Figure 4.3-58 OMPS Memory/Table Dump Middle Packet Format

LAST PACKET

| - 1    |              |                   | DACKE           | T DDTMDDV | UEADED            |                   | User Data Field |                            |            |
|--------|--------------|-------------------|-----------------|-----------|-------------------|-------------------|-----------------|----------------------------|------------|
|        | Verson       | Packe             | t Identific     | cation    | Packet :          | Sequence          | Packet          | Table/Memory Dump          |            |
|        | No.          | Type<br>Indicator | Sec Hdr<br>Flag | APID      | Sequence<br>Flags | Sequence<br>Count | Length          | Table/Memory data<br>(end) | TOTAL      |
| Bits   | 3            | 1                 | 1               | 11        | 2                 | 14                | 16              | up to 8144                 | up to 8192 |
| Octets | 2            |                   |                 | 2         |                   | 2                 | 2               | up to 1018                 | up to 1024 |
| Value  | 000          | 0 /               | 0               | 0x22C     | 10                | varies            | varies          | varies                     |            |
| Te     | lemetry Pack | et                | -               | -         |                   | Last              | Packet          |                            |            |

## Figure 4.3-59 OMPS Memory/Table Dump Last Packet Format

FIRST PACKET of a group, but not of the first group Jser Data Field PACKET PRIMARY HEADER Pack Identification Packet Sequence Packet Length Start Packets OMPS Heade: Table/Memory Dump Spar No. Scan in RDR Sec Hdr APID Sequenc RDF Cont Table/Memorv data Sequence Cont Fla Indicato Flag Flags Count - 1 Version Count (middle) -1 TOTAL 8192 8032 Bit 11 14 16 64 8 8 16 8 8 1024 1004 Octet 8 2 1 varies varies varies varies varies Valu 000 0x220 0x3F9 varies varies 0.20 0. Secondary Header Telemetry Packet Presen Figure 4.3-60 OMPS Grouped Memory/Table Dump First Packet Format

| Table 4.3.19 | OMPS Memor | y/Table Dump | Packet User | <b>Data Fields</b> |
|--------------|------------|--------------|-------------|--------------------|
|--------------|------------|--------------|-------------|--------------------|

| Start Bit | Bit<br>Size | Mnemonic Name    | Description                                                                       | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                             | Data Type |
|-----------|-------------|------------------|-----------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 16          | CCSDS RDR VER    | Version Number of RDR                                                             | N/A                        | N/A                                                                                                                    | U         |
| 16        | 8           | CCSDS_CONT_COUNT | Number of segmented CCSDS packet sequences - 1                                    | N/A                        | N/A                                                                                                                    | U         |
| 24        | 8           | CCSDS_CONT_FLAG  | Indicates if this CCSDS packet begins an RDR                                      | N/A                        | N/A                                                                                                                    | U         |
| 32        | 8           | SENSOR_ID        | OMPS Sensor Identification (not for Dwell or FSW Bootup status)                   | N/A                        | N/A                                                                                                                    | U         |
| 40        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) major version | N/A                        | N/A                                                                                                                    | U         |
| 48        | 8           | FSW_VERSION      | Flight Software Version Number (not for Dwell or FSW Bootup status) minor version | N/A                        | N/A                                                                                                                    | U         |
| 56        | 2           | MEB_BOOT_IMG_ID  | Boot Image Identifier (not for Dwell or FSW Bootup status)                        | 0<br>1<br>2<br>3           | As launched boot image<br>Flight Modifiable<br>Not used<br>Motorola Debug Monitor (TDMwhich we should never boot from) | U         |
| 58        | 5           | MEB SBC ID       | Single Board Computer Identifier (not for Dwell or FSW Bootup status)             | N/A                        | N/A                                                                                                                    | U         |
| 63        | 1           | MEB_SIDE         | Active MEB Side (not for Dwell or FSW Bootup status)                              | 0                          | MEB2<br>MEB1                                                                                                           | U         |
| 64        | 8           | FSW_INIT_STATUS  | Flight Software Initialization Status (not for Dwell or FSW Bootup status)        | 0-1                        | OK<br>ERROR                                                                                                            | U         |
| 72        | 8           | FSW_INIT_CODE    | Flight Software Initialization Code (not for Dwell or FSW Bootup status)          | N/A                        | N/A                                                                                                                    | U         |
| 80        | 8           | FSW_PROTECTED    | OMPS Protected State Indicator (not for Dwell or FSW Bootup status)               | 1 0                        | PROTECTED<br>UNPROTECTED                                                                                               | U         |
| 88        | 4           | MEB_FLASH_PWR    | SBC Flash Memory Power State (not for Dwell or FSW Bootup status)                 | 0                          | OFF<br>ON                                                                                                              | U         |
| 92        | 4           | EEPROM_SIDE      | EEPROM side used to boot                                                          | 0<br>1                     | Boot Side 1<br>Boot Side 2                                                                                             | U         |
| 96        | 16          | DMP_TBL_ID       | Table ID of last table dumped                                                     | N/A                        | N/A                                                                                                                    | U         |
| 112       | 8           | DMP_MEM_TYPE     | Table dump memory type (RAM or NVM)                                               | 0                          | RAM<br>NVM                                                                                                             | U         |
| 120       | 32          | DMP_OFFSET       | Table dump offset in bytes                                                        | N/A                        | N/A                                                                                                                    | U         |
| 152       | 32          | DMP_SIZE         | Table Dump size in bytes                                                          | N/A                        | N/A                                                                                                                    | U         |
| 184       | varies      | N/A              | Memory or Table Dump Contents                                                     | N/A                        | N/A                                                                                                                    | U         |

Le dimo fisiti bitis Table Dump Size in bytes Memory or Table Dump Contents

#### 4.3.7.13 Test Telemetry

When commanded, OMPS will generate one fixed Test Telemetry packet every 5 seconds until disabled by command. The Test Telemetry packet consists of a packet header with APID 546 and a fixed data pattern of 250 'CC' hex characters for a total of 256 bytes. Figure 4.3-61 shows the format of the OMPS Test Telemetry Packet.

| ĺ                                                                                     |        |           | PACKE      | T PRIMARY | HEADER   |                   |        |   | User Data Field |       |
|---------------------------------------------------------------------------------------|--------|-----------|------------|-----------|----------|-------------------|--------|---|-----------------|-------|
|                                                                                       | Verson | Packe     | t Identifi | cation    | Packet   | Sequence          | Packet |   | Test Pattern    |       |
|                                                                                       | No.    | Туре      | Sec Hdr    | APID      | Sequence | Sequence Sequence |        |   |                 |       |
|                                                                                       |        | Indicator | Flag       |           | Flags    | Count             |        | 4 |                 | ΤΟΤΑΙ |
| Bits                                                                                  | 3      | 1         | 1          | 11        | 2        | 14                | 16     |   | 2000            | 2048  |
| Octets                                                                                |        | :         | 2          |           |          | 2                 | 2      |   | 250             | 256   |
| Value                                                                                 | 000    | , 0       | 0 、        | 0x222     | 11       | varies            | 0x00F9 |   | repeating 0xCC  |       |
| Secondary Header<br>Not Present       Figure 4.3-61 OMPS Test Telemetry Packet Format |        |           |            |           |          |                   |        |   |                 |       |

| Figure 4.3-61   | <b>OMPS</b> Test | Telemetry   | v Packet | Format |
|-----------------|------------------|-------------|----------|--------|
| i iguio ilo o i |                  | i olollioti | ,        |        |

### 4.4 VIIRS

#### 4.4.4 Introduction

The VIIRS Sensor is a nadir viewing, cross-track observing, continuously operating electro-optical imaging sensor. It collects Earth and atmospheric scene spectral radiance in 22 channels spanning the visible through IR regions and sends these data to the NPP spacecraft for transmission to the ground. The 22 bands include 16 moderate resolution bands, 5 imaging resolution bands (which have twice the resolution of the moderate resolution bands), and a Day Night Band (DNB). The latter obtains imagery throughout both the day and night portions of the orbit. The VIIRS flies in a sun synchronous orbit that provides the along track component of the image. The cross track scan is implemented using optics and a rotating telescope as indicated in Figure 4.4-2.

Figure 4.4-1 illustrates the VIIRS Sensor from a downward-viewing perspective showing the mounting surfaces. As shown, the Sensor consists of two modules separately mounted to the spacecraft. The Opto-Mechanical Module contains all of the optical and mechanical assemblies required to collect Earth and calibration data including scanning optics, focal planes, and calibration sources. The Electronics Module provides all of the electrical interfaces to the NPP spacecraft. In response to spacecraft commands, it controls the VIIRS configuration, operates the mechanisms in the Opto-Mechanical Module and collects and formats the data from the focal planes and transmits it to the spacecraft. The Electronics module bolts to a nadir-facing Spacecraft cold plate (not shown).







Figure 4.4-2 VIIRS Simplified Design Concept

The scanning optics sweep the linear detector over the earth collecting of 22 coincident swaths of data (one per band), 16 or 32 samples wide. The moderate resolution and Day Night bands have 16 detectors and the imaging bands have 32 detectors arranged in an along-track linear configuration. The scan width on earth is just over 3,000 km, although other widths can be programmed when the instrument is in Diagnostic Mode. The nominal 1.7864 second scan interval is synchronized with the satellite motion so that the swaths of data taken on successive scans do not leave gaps in coverage on the Earth's surface. The nominal scan period is adjustable before launch by +/- 1%.

The processed VIIRS data produce the following EDRs:

Imagery

Sea Surface Temperature

Aerosol Optical Thickness

Aerosol Particle Size

Suspended Matter

Cloud Base Height

Cloud Cover/Layers

Cloud Effective Particle Size

Cloud Optical Thickness

Cloud Top Height

Cloud Top Pressure

Cloud Top Temperature

Albedo (surface)

Land Surface Temperature

Vegetation Index

Snow Cover

Surface Type

Ice Surface Temperature

Net Heat Flux

Ocean Color/Chlorophyll

Sea Ice Characterization

Soil Moisture

## 4.4.5 Instrument Function

The many VIIRS hardware elements are grouped into a lesser number of functional subsystems for the purpose of overall operational control and data collection/generation by commands, telemetry, and packets. The goal of this partitioning into subsystems is to focus on the end user operational interest, and may be tempered by interrelated control and support elements and quantity of major parameters. A subsystem may be a single circuit card assembly or several, a module, or a group of mechanical items. Figure 4.4-3 provides the defined subsystems together with their 2-alpha identifiers (ID's), summarized in Table 4.4.1.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

| SC                | Spacecraft (NPP or NPOESS)                                                       |  |
|-------------------|----------------------------------------------------------------------------------|--|
| AP                | ASP - Analog Signal Processor & related FPA's                                    |  |
| BB                | OBB - Onboard Black Body                                                         |  |
| СР                | Control Processor with common power block<br>(1394, SBC, CTA, DPP & partial HMA) |  |
| CT *              | CTA - Command & Telemetry Assembly                                               |  |
| DP                | DPP - Digital Preprocessor                                                       |  |
| EM *              | Electronics Module                                                               |  |
| FT                | FTC - Focal Plane Temperature Controller                                         |  |
| НМ                | HMA - Heater & Mechanism Assembly                                                |  |
| MF *              | Mainframe                                                                        |  |
| PS                | Power Supply                                                                     |  |
| SD                | SDSM - Solar Diffuser Stability Monitor                                          |  |
| SE                | SCE - Servo Control Electronics & motors                                         |  |
| * These subsystem | ns only have telemetry items.                                                    |  |

| Table 4.4.1 | VIIRS 2-AI | pha Subs <sup>y</sup> | vstem IDs |
|-------------|------------|-----------------------|-----------|
|             |            |                       |           |

The VIIRS images the scene with a Rotating Telescope and a rotating Half Angle Mirror (HAM), which together scan the field of view across the scene, followed by a stationary Aft Imager telescope and spectral separation optics that route segments of the electromagnetic spectrum through three paths to the Focal Planes.

The visible and near infrared portion of the spectrum (approximately 0.4  $\mu$ m to 0.89  $\mu$ m) is routed to a Visible and Near-Infrared Focal Plane Assembly (Vis/NIR FPA) with detectors for nine spectral bands. This optical path also illuminates the Day/Night Band (DNB) FPA that is located adjacent to the Vis/NIR FPA. The short-wavelength to mid-wavelength infrared (SWMWIR) portion of the spectrum (approximately 1.2  $\mu$ m to 4.4  $\mu$ m) is routed to a SWMWIR FPA with detectors for eight spectral bands. The long-wavelength infrared (LWIR) portion of the spectrum (approximately 8.4  $\mu$ m to 12.5  $\mu$ m) is routed to a LWIR FPA with five sets of detectors covering four spectral bands.

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.



Subsystem 2-Alpha IDs: SC & VIIRS AP, BB, CP, CT, DP, EM, FT, HM, MF, PS, SD & SE

Figure 4.4-3 VIIRS Subsystem Overview with 2-alpha lds

A passive Cryoradiator viewing deep space cools the SWMWIR and LWIR FPAs to enable low noise detection of the required wavelengths of infrared radiation.

In the VIIRS Electronics Module, the Analog Signal Processor (ASP or AP) read the measured scene radiances from the FPAs in analog form and process them until the Digitial Preprocessor (DPP or DP) converts them to digital form. The Control Processor (CP) subsystem performs lossless entropy coding on the data, and formats the compressed data into CCSDS packets transmitted to the spacecraft via an IEEE 1394 interface. Much of the formatting process is performed by the reprogrammable VIIRS Single Board Computer (SBC).

In the VIIRS Electronics Module, the Command & Telemetry Assembly (CTA or CT) performs processing and execution of commands, control of temperatures within the sensor through the Focal Plane Temperature Controller (FT) and operation of all moving mechanisms. The SBC measures and formats the "engineering" and telemetry data necessary to verify the VIIRS sensor status and to process the VIIRS scene data. Essentially all of the electronic circuits are redundant.

In each scan, VIIRS views two full-aperture on-board calibration sources and deep space in addition to the earth. The calibration sources include a Blackbody (BB) with accurately-known emissivity and temperature, and a Solar Diffuser (SD) that provides precisely-attenuated sunlight in the visible region of the spectrum. Since the diffusing surface of the SD may degrade slightly over time on orbit, the sensor also includes a Solar Diffuser Stability Monitor (SDSM) to detect changes in the SD's reflected radiance. SD and SDSM data is only valid during a one minute window each orbit that occurs near the Earth's south pole when the sun illuminates their respective input ports. The view of Check the NPP CCR website at <a href="https://cicero.eos.nasa.gov/npp">https://cicero.eos.nasa.gov/npp</a> to verify that this Is the correct version prior to use.

space prior to each scan acts as a known low-radiance source, and also provides occasional observations of the moon.

The VIIRS includes the following controllable mechanisms: (1) Rotating Telescope motor, (2) Half Angle Mirror motor, (3) a stepper motor that turns the three-position pointing mirror within the SDSM, (4) Nadir Aperture Doors (NAD), (5) Cryoradiator Door (CD), and (6) Rotating Telescope launch lock release mechanism. Once opened, the NAD and CD cannot be closed on orbit. The Rotating Telescope launch lock also cannot be reengaged on orbit once it has been released.

The two VIIRS Power Supplies (PS) provide power conditioning. Each has five sections, labeled A through E. When the VIIRS first turns On, Section\_A is the only module that automatically comes On. The other sections are commanded On to support the particular sensor mode or activity.

The Heaters & Mechanism Assembly (HMA or HM) controls the heaters to activate the telescope launch locks and open the cryocooler and nadir aperture doors. It also maintains other components, including the cryocooler stages for outgassing, the blackbody calibrator, the DNB CCD and focal plane arrays, and the telescope and Half Angle Mirror motors.

#### 4.4.6 Modes and Packet Structure

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VIIRS has 9 Sensor Modes to support NPP mission operations. The modes and most common transitions are illustrated by the Figure 4.4-4. The spacecraft controls entry and exit of the first three modes. The remaining modes are established by a single bus Mode command, except for the Outgas Mode when the 100V Outgas PS's are not turned on until the transition configuration has been reached & verified.

Note, "Sensor Modes" is used as the modes title instead of "Operational Modes," in order not to cause interpretation conflict with the "OPERATIONAL DAY/NIGHT" mode.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.



Figure 4.4-4 VIIRS Sensor Mode Transition Diagram

VIIRS outputs six types of packets unique to the X-band. Science and Calibration data packets are transmitted only during Operational Mode. Engineering packets are output in either Diagnostic or Operational Mode. Diagnostic, Dwell and Memory Dump packets are output only in Diagnostic Mode. Table 4.4.2 lists all X-band unique APIDs.

- 1. Science
- 2. Calibration
- 3. Engineering
- 4. Diagnostic
- 5. Dwell Telemetry
- 6. Memory Dump

| VC | AP       |                                 | Data Rate (bp | os) by Mode | Dow          | nlink        | Packet              |
|----|----------|---------------------------------|---------------|-------------|--------------|--------------|---------------------|
| ID | лі<br>ID | Telemetry Packet Name           | Operational   | Diagnostic  | HRD          | SMD          | (octets),<br>Note 8 |
| 0  | 768      | Housekeeping, Note 7            | Note 7        | Note 7      | $\checkmark$ | $\checkmark$ | Note 7              |
| 0  | 769      | LEO&A Housekeeping, Note 7      | Note 7        | Note 7      | $\checkmark$ | $\checkmark$ | Note 7              |
| 18 | 770      | Test Packet                     |               | 1146.4      |              | $\checkmark$ | 256                 |
| 0  | 773      | Diag Dwell Tlmy                 |               | 1997.3      |              | $\checkmark$ | 446                 |
| 21 | 780      | Mem Dump                        |               |             |              | $\checkmark$ | Up to<br>4196524    |
| 16 | 800      | HRD Operational (Day Only) - M4 | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*             |
| 16 | 801      | HRD Operational (Day Only) - M5 | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*             |

## Table 4.4.2 VIIRS Mission Data Packet Types

| VC | AP  |                                      | Data Rate (bp | os) by Mode | Dow          | nlink        | Packet                      |
|----|-----|--------------------------------------|---------------|-------------|--------------|--------------|-----------------------------|
| ID | ID  | Telemetry Packet Name                | Operational   | Diagnostic  | HRD          | SMD          | <b>(octets)</b> ,<br>Note 8 |
| 16 | 802 | HRD Operational (Day Only) – M3      | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*                     |
| 16 | 803 | HRD Operational (Day Only) – M2      | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*                     |
| 16 | 804 | HRD Operational (Day Only) – M1      | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*                     |
| 16 | 805 | HRD Operational (Day Only) – M6      | variable*     |             | $\checkmark$ | $\checkmark$ | 86656*                      |
| 16 | 806 | HRD Operational – M7                 | variable*     |             | $\checkmark$ | $\checkmark$ | 177016*                     |
| 16 | 807 | HRD Operational (Day Only) – M9      | variable*     |             | $\checkmark$ | ~            | 86656*                      |
| 16 | 808 | HRD Operational – M10                | variable*     |             | $\checkmark$ | ✓            | 86656*                      |
| 16 | 809 | HRD Operational – M8                 | variable*     |             | $\checkmark$ |              | 86656*                      |
| 16 | 810 | HRD Operational (Day Only) –<br>M11  | variable*     |             | ~            |              | 86656*                      |
| 16 | 811 | HRD Operational – M13                | variable*     |             |              | ~            | 177016*                     |
| 16 | 812 | HRD Operational – M12                | variable*     |             | $\checkmark$ | ~            | 86656*                      |
| 16 | 813 | HRD Operational – I4                 | variable*     |             | ~            | ~            | 340412*                     |
| 16 | 814 | HRD Operational – M16                | variable*     | 4           | $\checkmark$ | $\checkmark$ | 86656*                      |
| 16 | 815 | HRD Operational – M15                | variable*     | <u>.</u>    | ~            | ~            | 86656*                      |
| 16 | 816 | HRD Operational – M14                | variable*     | <u> </u>    | $\checkmark$ | $\checkmark$ | 86656*                      |
| 16 | 817 | HRD Operational – I5                 | variable*     |             | $\checkmark$ | $\checkmark$ | 340412*                     |
| 16 | 818 | HRD Operational (Day Only) – I1      | variable*     |             | ~            | ~            | 340412*                     |
| 16 | 819 | HRD Operational (Day Only) – I2      | variable*     |             | $\checkmark$ | $\checkmark$ | 340412*                     |
| 16 | 820 | HRD Operational (Day Only) – I3      | variable*     |             | $\checkmark$ | $\checkmark$ | 340412*                     |
| 16 | 821 | HRD Operational - DNB                | variable*     |             | $\checkmark$ | $\checkmark$ | 124756*                     |
| 16 | 822 | HRD Operational, Note 3 – DNB<br>MGS | Variable*     |             | ~            | $\checkmark$ | 124756*                     |
| 16 | 823 | HRD Operational, Note 3 – DNB<br>LGS | Variable*     |             | $\checkmark$ | ~            | 124756*                     |
| 18 | 824 | HRD Operational Test, Note 4         | Note 4        |             |              | $\checkmark$ | Note 4                      |
| 16 | 825 | HRD Operational Calibration          | Variable*     |             | $\checkmark$ | $\checkmark$ | 188806*†                    |
| 16 | 826 | HRD Oper Engineering, Note 2         | 41,728.6      |             | $\checkmark$ | $\checkmark$ | 9318                        |
| 18 | 830 | HRD Diagnostic – M4, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 831 | HRD Diagnostic – M5, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 832 | HRD Diagnostic – M3, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 833 | HRD Diagnostic – M2, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 834 | HRD Diagnostic – M1, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 835 | HRD Diagnostic – M6, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 836 | HRD Diagnostic – M7, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 837 | HRD Diagnostic – M9, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 838 | HRD Diagnostic – M10, Note 5         |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 839 | HRD Diagnostic – M8, Note 5          |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 840 | HRD Diagnostic – M11, Note 5         |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 841 | HRD Diagnostic – M13, Note 5         |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 842 | HRD Diagnostic – M12, Note 5         |               | 207308.6    |              | $\checkmark$ | 46292                       |
| 18 | 843 | HRD Diagnostic – I4, Note 5          |               | 811339      |              | $\checkmark$ | 181236                      |

| VC |     |                                     | Data Rate (bp | os) by Mode | Dow | nlink        | Packet                      |
|----|-----|-------------------------------------|---------------|-------------|-----|--------------|-----------------------------|
| ID | ID  | Telemetry Packet Name               | Operational   | Diagnostic  | HRD | SMD          | <b>(octets)</b> ,<br>Note 8 |
| 18 | 844 | HRD Diagnostic – M16, Note 5        |               | 207308.6    |     | $\checkmark$ | 46292                       |
| 18 | 845 | HRD Diagnostic – M15, Note 5        |               | 207308.6    |     | $\checkmark$ | 46292                       |
| 18 | 846 | HRD Diagnostic – M14, Note 5        |               | 207308.6    |     | $\checkmark$ | 46292                       |
| 18 | 847 | HRD Diagnostic – I5, Note 5         |               | 811339      |     | $\checkmark$ | 181236                      |
| 18 | 848 | HRD Diagnostic – I1, Note 5         |               | 811339      |     | $\checkmark$ | 181236                      |
| 18 | 849 | HRD Diagnostic – I2, Note 5         |               | 811339      |     | ~            | 181236                      |
| 18 | 850 | HRD Diagnostic – I3, Note 5         |               | 811339      |     | ✓            | 181236                      |
| 18 | 851 | HRD Diagnostic – DNB, Note 5        |               | 193264.7    |     | $\sim$       | 43156                       |
| 18 | 852 | HRD Diagnostic – DNB MGS,<br>Note 5 |               | 193264.7    |     |              | 43156                       |
| 18 | 853 | HRD Diagnostic – DNB LGS, Note<br>5 |               | 193264.7    |     | ~            | 43156                       |
| 18 | 854 | HRD Diagnostic Test, Note 4         |               | Note 4      |     | $\checkmark$ | Note 4                      |
| 18 | 855 | HRD Diag Calibration, Note 5        |               | 845526.2    |     | $\checkmark$ | 188806†                     |
| 18 | 856 | HRD Diag Engineering, Note 5        |               | 41,728.6    |     | $\checkmark$ | 9318                        |

 VIIRS is assigned 128 decimal integer APIDs 768 – 895. Table is by APID sequence. Presently 37 Spares. Only those APIDs unique to the X-band are shown.

2. HRD Operational in compressed form except Engineering.

- 3. Packet size same as normal DNB data (rarely transmitted & then only in Night Mode).
- 4. Not used but is reserved. Fixed test packets upon command occur in assigned Operational & Diagnostic band packets with Header Test Flag. See VIIRS Command, Telemetry, Science & Engineering Data Description for description.
- 5. HRD Diagnostic not compressed.
- 6. LRD Operational not on Flight 1. Compressed by Spacecraft except Engineering.
- 7. Documented in the NPP Command & Telemetry Handbook
- 8. Packet sizes include all octets in a grouped packets. VIIRS Operational and Diagnostic packets are grouped by design. See the respective sections for the size of each packet within the group.
- \* The Operational packets sizes and data rates are variable due to compression. The table lists the size with all fields uncompressed.
- † The Calibration Packet content and size changes between Day and Night Modes. The size listed in the Table is the larger Night size. In Day Mode, the group of 24 uncompressed packets is 186118 octets.

## 4.4.6.1 Off Mode and Launch Mode

The VIIRS is in Off Mode when no external power is applied. The sensor performs no functions. The Launch Mode describes the state of the VIIRS with nadir aperture and cryoradiator doors latched, launch locks applied and no power applied. Once activated after Launch Mode, the VIIRS is not expected to transition to Off mode but may do so by removing all power.

## 4.4.6.2 Survival Mode

In the VIIRS Survival Mode, the NPP spacecraft provides power to survival heaters sufficient to maintain a safe environment for the sensor. Otherwise, the mode is identical to Off Mode. No mission data is output.

### 4.4.6.3 Activation Mode

The VIIRS enters Activation Mode when power is initially applied or by command. The telescope does not rotate during Activation Mode so no Mission Data are output. Housekeeping telemetry is output to indicate the initial state of the sensor.

#### 4.4.6.4 Outgassing Mode

The VIIRS sensor is placed into Outgassing Mode while the sensor is in Activation Mode by enabling the execution of outgas heater commands. This mode is used to decontaminate certain mechanical or optical elements of the sensor. Housekeeping telemetry is output but the telescope remains in a stowed position so no mission data are output.

#### 4.4.6.5 Operational Mode

Operational mode is the normal operating condition for the sensor. It has two submodes for the day and night portions of the orbit. All data outputs are on, scene data and calibration source data are transmitted, and telemetry is monitored and transmitted. As the spacecraft moves through its orbit, commands stored in the Stored Command Table cause the VIIRS to switch between Operational/Night and Operational/Day submodes at the appropriate times. This table will permit at least 60 days of autonomous operation and must be updated by ground commands and table uploads weekly.

The VIIRS outputs all spectral bands in Operational/Day mode. In Operational/Night Mode only 11 of its 22 spectral bands as identified in Table 4.4.3 are transmitted. The VIIRS is also capable of transmitting the medium and low gain data from Stages 2 and 3 of the Day/Night Band CCD upon command. These data will be formatted in the same manner as other DNB data but in separate APIDs (822 and 823). The normal Night mode data will continue to be transmitted. In all other ways, these two sub-modes are identical.

#### 4.4.6.6 Diagnostic/Early Orbit Checkout Mode

Diagnostic/Early Orbit Checkout mode encompasses many sensor configurations necessary to support early post-launch checkout of the VIIRS, to support housekeeping and software updates, and to support trouble shooting by allowing different sampling of telemetry. Sensor data with little post-processing are output in a distinct set of APIDs from operational mode. The normal post-processing functions can be re-activated upon command.

Since the data format is complicated, test patterns can be enabled to fill the data output sequence with one or more chosen standard pixel sequences for each band, in place of the actual detector output data. The known sequence is sent along the sensor electronics, through the formatting, and on to the spacecraft. Ground analysts verify proper operation of the post-processing and formatting functions.

In the Diagnostic/Early Orbit Checkout mode, Dwell telemetry data packets can replace the normal telemetry packets upon command.

The VIIRS supports software modifications only in Diagnostic/Early Orbit Checkout Mode. Thus the Memory Dump packet will be output only in this mode.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

### 4.4.6.7 Safe Mode

Under fault conditions sensed by the VIIRS or the spacecraft, the VIIRS turns off collection of science data and stows the telescope within 45 seconds. No mission data are output though housekeeping telemetry remains enabled.

#### 4.4.7 Mission Data

Sensor data is collected from four views - Earth View, Space View, Solar Diffuser, and Blackbody. The VIIRS collects Earth view data over a field of view that is approximately +/- 56 degrees from nadir. The Earth view data is processed and downlinked in the Science Data packets. The Space View, Solar Diffuser View, and Blackbody View are collected to support instrument calibration and are downlinked in the Calibration Packet.

All SC-VIIRS 1394 bus data exchanges are via CCSDS packets. Packet formats comply with the CCSDS Standards, as tailored for NPOESS use per the FT1394 System IRD. The secondary header timestamp is formatted consistent with Table 4.1.3. It represents the time at the start of the scan, except for Memory Dump packets where it represents the current time the memory dump was generated. All fields are big endian.

### 4.4.7.1 Science Data

The VIIRS Science Data consists of 24 unique APIDs output during Operational mode. There is one APID for each of the five imaging and sixteen moderate resolution bands. The Day Night Band has 3 APIDs to identify three levels of gain settings. The low-gain packet is output for the full orbit and the packets medium and high gain outputs can be enabled during the night portion of the orbit.

All of the science APIDs have a common format. Each packet contains one scan of data from one band formatted into grouped packets. Each science data grouped packet consists of a First CCSDS Packet, N-1 Middle CCSDS Packets, and a Last CCSDS Packet, where N is the number of detectors associated with the band (16 or 32). The number of detectors is shown in Table 4.4.4 and is present in the Number\_of\_Packets parameter in the Secondary Header of the First packet.

Table 4.4.3 shows the instrument bands by type (e.g. visible, IR), by gain characteristics, and lists the predominant noise source for each band. A key element is the gain characteristics of each band (single or dual gain) because this defines other processing. The M16 band uses time delay integration (TDI) of two sensors, M16A and M16B. Its data are sent as a single band in the science and diagnostic packets, but sent separately in the calibration packet.

|     | Band | λ      | Δλ    | Gain      | Noise Source | Radiance   |
|-----|------|--------|-------|-----------|--------------|------------|
|     | M1   | 0.412  | 0.020 | Dual High | Photon       | Reflective |
|     |      | 0.412  | 0.020 | Low       | Photon       |            |
|     | M2   | 0.445  | 0.018 | Dual High | Photon       | Reflective |
|     |      | 0.445  | 0.018 | Low       | Photon       |            |
|     | M3   | 0.488  | 0.020 | Dual High | Photon       | Reflective |
| S   |      | 0.488  | 0.020 | Low       | ASP          |            |
| >   | M4   | 0.555  | 0.020 | Dual High | Photon       | Reflective |
|     |      | 0.555  | 0.020 | Low       | ASP          |            |
|     | l1   | 0.640  | 0.080 | Single    | ASP          | Reflective |
|     | M5   | 0.672  | 0.020 | Dual High | Photon       | Reflective |
|     |      | 0.672  | 0.020 | Low       | ASP          |            |
|     | M6   | 0.746  | 0.015 | Single    | Photon       | Reflective |
|     | 12   | 0.865  | 0.039 | Single    | Photon       | Reflective |
| NIR | M7*  | 0.865  | 0.039 | Dual High | Photon       | Reflective |
|     |      | 0.865  | 0.039 | Low       | ASP          |            |
|     | M8*  | 1.240  | 0.020 | Single    | Detector     | Reflective |
| ~   | M9   | 1.378  | 0.015 | Single    | Detector     | Reflective |
| MI  | 13   | 1.610  | 0.060 | Single    | Detector     | Reflective |
| S   | M10* | 1.610  | 0.060 | Single    | ASP          | Reflective |
|     | M11  | 2.250  | 0.050 | Single    | Detector     | Reflective |
|     | I4*  | 3.740  | 0.380 | Single    | Detector     | Emissive   |
| /IR | M12* | 3.700  | 0.180 | Single    | Detector     | Emissive   |
| ž   | M13* | 4.050  | 0.155 | Dual High | Photon       | Emissive   |
|     |      | 4.050  | 0.155 | Low       | ASP          |            |
|     | M14* | 8.550  | 0.300 | Single    | Detector     | Emissive   |
| IIR | M15* | 10.763 | 1.000 | Single    | ASP          | Emissive   |
| Ň   | 15*  | 11.450 | 1.900 | Single    | Detector     | Emissive   |
|     | M16* | 12.013 | 0.950 | Single    | Detector     | Emissive   |
|     | DNB* | 0.7    | 0.4   | Variable  | Photon       | Reflective |

Table 4.4.3 VIIRS Science Data Packet Band Information

\* Indicates the bands output during Operational/Night Mode.

The science data Middle and Last packets contain subfields specifying the location of the first pixel (or sample) in the packet and the number of pixels (or samples) in the packet. This information is not needed when the instrument is in Operational mode. However, in Diagnostic mode each packet does not contain data corresponding to an entire scan so the location of the first pixel and number of pixels parameters are needed for displaying and interpreting the data in a packet.

| [1]                           | [2]  | [3]          | [4]       | [5]       | [6]      | [7]       | [8]       |
|-------------------------------|------|--------------|-----------|-----------|----------|-----------|-----------|
| Band                          | # of | # of Gain    | # of Bits | Total     | # of     | # of      | # of      |
|                               | Zero | Bits         | for Data  | Number of | Gain     | Dets/Band | Bits/Word |
|                               | Bits |              | Number    | Bits (15) | Settings |           |           |
| <u>M1</u>                     | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M2                            | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| <u>M3</u>                     | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M4                            | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M5                            | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M6                            | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| <b>M</b> 7                    | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M8                            | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M9                            | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M10                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M11                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M12                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M13                           | 2    | 1            | 12        | 15        | 2        | 16        | 13        |
| M14                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M15                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| M16                           | 3    | 0            | 12        | 15        | 1        | 16        | 12        |
| I1                            | 3    | 0            | 12        | 15        | 1        | 32        | 12        |
| I2                            | 3    | 0            | 12        | 15        | 1        | 32        | 12        |
| I3                            | 3    | 0            | 12        | 15        | 1        | 32        | 12        |
| I4                            | 3    | 0            | 12        | 15        | 1        | 32        | 12        |
| I5                            | 3    | 0            | 12        | 15        | 1        | 32        | 12        |
| DNB (stage1)                  | 0    | 1 (set"O")   | 14        | 15        | NA       | 16        | 15        |
| Most sensitive                |      |              |           |           |          |           |           |
| (low rad/high gain)           |      |              |           |           |          |           |           |
| DNB (stage2)                  | 0    | 2 (set "10") | 13        | 15        | NA       | 16        | 15        |
| (med rad/med gain)            |      |              |           |           |          |           |           |
| DNB (stage3)                  | 0    | 2 (set "11") | 13        | 15        | NA       | 16        | 15        |
| Least sensitive               |      |              |           |           |          |           |           |
| (high rad/low gain)           |      |              |           |           |          |           |           |
| DNB MGS                       | 0    | 2 (set "10") | 13        | 15        | NA       | 16        | 15        |
| All data is med rad/med gain  |      |              |           |           |          |           |           |
| Apply Stage2                  |      |              |           |           |          |           |           |
| DNB LGS                       | 0    | 2 (set "11") | 13        | 15        | NA       | 16        | 15        |
| All data is high rad/low gain | -    |              |           |           |          |           |           |
| Apply Stage 3                 |      |              |           |           |          |           |           |

Table 4.4.4 VIIRS Gain, Detector, & Bit Summary for Science Data

Notes: [8] indicates meaningful band bits before compression & after ground data recovery. For the dual gain bands (bold in the table), the following logic applies to the gain bit. If the gain bit == 0, this is a HIGH State. If the gain bit == 1, this is a LOW State. All DNB bands above Stage 1 are the most significant bit of the 14 bit value.

Table 4.4.4 summarizes the characteristics of the data words in each band. All data words are 15 bits in length, however the allocation of the bits between gain and data information depends on the band. The number of detectors in each band is also shown for reference in the table.

To meet the requirements for EDR products, accommodate S/C downlink bandwidth limitations, and compensate for artifacts arising from the scan geometry over the Earth's surface, several types of on-board processing can be performed by the instrument electronics. Figure 4.4-5, shows the artifacts of the scanning geometry.

Bow Tie Deletion eliminates redundant data at the edges of successive scans to reduce the data rate. Sample aggregation, the combining of adjacent samples along a scan, reduces overall bandwidth, improves SNR, and matches the IFOV footprints of samples across the scan. Spectral and/or spatial differential encoding of the bands followed by lossless compression reduces the data rate (This is not shown in Figure 4.4-5).



Figure 4.4-5 VIIRS Scanning Geometry for Science Data

There are two instrument modes which send scanning data - Operational and Diagnostic. The latter is provided for early orbit support, anomaly resolution and test. In Operational Mode the instrument performs all of the processing indicated above - Bow Tie deletion, Aggregation, and Lossless Compression. In Diagnostic Mode, all of these processing functions are disabled. Additionally operators control the width of the effective scan, and thus the amount of data collected per scan, and/or the number of bands actually packetized and downlinked. This enables the downlink bandwidth constraints to be met in Diagnostic Mode.

The Day Night Band processing differs from that described above in several respects. Bow Tie Deletion is not performed for the Day Night Band in a way that is identifiable at the packet level. Rather than by post processing, the DNB inherently aggregates the CCD data on both sides of Nadir during data collection by a series of sample timing steps. At the packet level the DNB samples are organized into 6 aggregation zones, so they resemble the other bands; however the aggregation of the DNB samples is performed differently from the other bands as just indicated. Compression is performed on the DNB data in each of the aggregation zones at the packet level.

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The term Sample is used to denote the output of one detector taken at a given instant of time. When Samples are combined in the aggregation process the term Pixel is used to denote the result. This nomenclature is consistent at the packet level. However, it should be noted that if the data is being described at a lower level these definitions require some qualification, especially for the DNB.

A functional overview of the on-board processing performed in Operational Mode is shown in Figure 4.4-6. Moderate resolution and imaging bands undergo sample aggregation, bow tie deletion, spectral or spatial differential encoding, and compression. As these are programmable operations, the VIIRS packets indicate whether aggregation, bow tie deletion, and compression are performed, and the processing order for spectral differential encoding. Arithmetic processing is performed prior to differential encoding to ensure that the differential encoding process does not result in negative numbers. For dual gain bands, additional processing is performed to incorporate data on the gain state into the data words. After unique aggregation described below in Section 4.4.7.1.6, DNB data is compressed like the other bands.





## 21.4.7.1.1 Operational Mode Aggregation

Sample aggregation is performed on the single gain bands. Samples are aggregated 3:1, 2:1, or 1:1 to form Pixels. The amount of aggregation is a function of their location in the scan, with 3:1 aggregation occurring in the middle of the scan and 1:1 (no) aggregation occurring at the edges. The regions over which aggregation is performed are called Aggregation Zones.

Figure 4.4-7 illustrates the aggregation process and the formation of aggregation zones for single gain and imaging bands. (DNB aggregation is described below in the DNB

Processing section.) Although the number of detectors and pixels vary, the aggregation process is the same for the moderate resolution single gain bands and the single gain imaging bands. Figure 4.4-8 shows the boundaries and sizes of the aggregation zones and the along-scan resolution that results after aggregation of the single gain bands. Although no aggregation is actually performed on the dual gain band data, it is grouped into six "aggregation zones" for purposes of spectral differencing and compression. Thus when viewed at the packet level, the data from dual gain bands looks very similar to that from single gain bands.



The number of Pixels in each Aggregation Zone is a function of the Band Type (Imaging, Moderate Resolution/ Single Gain, Moderate Resolution/ Dual Gain, or Day-Night (DNB)

|         | •                  |           |                  |   |                  |                 |                    |  |
|---------|--------------------|-----------|------------------|---|------------------|-----------------|--------------------|--|
| 1:      | :1 2:              | 1         | 3: 1             |   | 3: 1             | 2: 1            | 1:1                |  |
| Aggrega | tion Zone Aggregat | tion Zone | Aggregation Zone |   | Aggregation Zone | Aggregation Zon | e Aggregation Zone |  |
| -56     | -43                | -32       |                  | Ö |                  | 32              | 43 5               |  |
|         | Degrees from Nadir |           |                  |   |                  |                 |                    |  |

Figure 4.4-7 VIIRS OVERVIEW OF AGGREGATION & AGGREGATION ZONES FOR SINGLE GAIN/IMAGING HRD – OPERATIONAL MODE

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Figure 4.4-8 VIIRS Overview of Aggregation Zone Definition

## 4.4.7.1.2 Operational Mode Bow Tie Deletion

Bow Tie Deletion is applied to all imaging and moderate resolution bands irrespective of their gain characteristics. To simplify processing, Bow Tie Deletion is done at the aggregation zone level on a detector-by-detector basis. Although this results in some overlaps remaining between successive scans, the reduction in processing complexity and the fact that the overlaps can be calculated make it worthwhile. Bow Tie Deletion at the aggregation zone level means that some of the aggregation zones, in particular those at the corners of a scan, are of length zero. This is seen in Table 4.4.5 and Table 4.4.6. The DPP substitutes a single 4-byte block of zeros for these zones. These aggregation zones should not be processed.

# Table 4.4.5 VIIRS NUMBER OF PIXELS PER AGGREGATION ZONE FOR SINGLE GAIN BANDS – OPERATIONAL MODE

| Detectors    | Singl<br>Num | e Gain I<br>ber of P                  | ands<br>ones | Total Pixels |       |     |      |  |
|--------------|--------------|---------------------------------------|--------------|--------------|-------|-----|------|--|
|              | 1            | 2                                     | 3            | 4            | 5     | 6   |      |  |
| 0            | 0            | 0                                     | 592          | 592          | 0     | 0   | 1184 |  |
| 1            | 0            | 368                                   | 592          | 592          | 368   | 0   | 1920 |  |
| 2 through 13 | 640          | 368                                   | 592          | 592          | 368   | 640 | 3200 |  |
| 14           | 0            | 368                                   | 592          | 592          | 368   | 0   | 1920 |  |
| 15           | 0            | 0                                     | 592          | 592          | 0     | 0   | 1184 |  |
|              |              | Single                                | Gain In      | naging l     | Bands |     |      |  |
| Detectors    | Num          | Number of Pixels in Aggregation Zones |              |              |       |     |      |  |
|              |              |                                       |              |              |       |     |      |  |
| 0, 1         | 0            | 0                                     | 1184         | 1184         | 0     | 0   | 2368 |  |

| 2, 3         | 0    | 736 | 1184 | 1184 | 736 | 0    | 3840 |
|--------------|------|-----|------|------|-----|------|------|
| 4 through 27 | 1280 | 736 | 1184 | 1184 | 736 | 1280 | 6400 |
| 28, 29       | 0    | 736 | 1184 | 1184 | 736 | 0    | 3840 |
| 30, 31       | 0    | 0   | 1184 | 1184 | 0   | 0    | 2368 |

## Table 4.4.6 VIIRS NUMBER OF SAMPLES PER AGGREGATION ZONES FOR DUAL GAIN BANDS – OPERATIONAL MODE

| Dual Gain Moderate Resolution BandsDetectorsNumber of Pixels in Aggregation Zones |     |     |      |      |     | Total Pixels | 3    |   |
|-----------------------------------------------------------------------------------|-----|-----|------|------|-----|--------------|------|---|
|                                                                                   | 1   | 2   |      |      |     |              |      |   |
| 0                                                                                 | 0   | 0   | 1776 | 1776 | 0   | 0            | 3552 | ) |
| 1                                                                                 | 0   | 736 | 1776 | 1776 | 736 | 0            | 5024 |   |
| 2 through 13                                                                      | 640 | 736 | 1776 | 1776 | 736 | 640          | 6304 |   |
| 14                                                                                | 0   | 736 | 1776 | 1776 | 736 | 0            | 5024 |   |
| 15                                                                                | 0   | 0   | 1776 | 1776 | 0   | 0            | 3552 |   |

### 4.4.7.1.3 Operational Mode Differential Coding & Compression

Differential encoding is performed between bands prior to compression to further reduce the amount of data. The rationale for the selection and ordering of bands for differential encoding are not presented here. Table 4.4.7 shows the band prediction table for differentially encoding the bands. For reference, Table 4.4.7 also shows information about each of the bands, including whether they are collected at night, and key optical parameters. Table 4.4.7 also shows the recommended transmission order of the bands. While this order is not obligatory, if the bands are transmitted in the sequence shown, ground processing and storage can be minimized.

Table 4.4.8 shows the processing functions that are implemented inside the "Processing for Differential Encoding" box in Figure 4.4-6 as a function of band. Note the relation of the A, B & C points.

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| Processing and<br>Transmission<br>Sequence | Encoded<br>Band | Night | Wavelength<br>(µm) | Bandwidth<br>(µm) | Predictor<br>Band | Wavelength<br>(µm) | Bandwidth<br>(µm) |
|--------------------------------------------|-----------------|-------|--------------------|-------------------|-------------------|--------------------|-------------------|
| 1                                          | M4              | No    | 0.555              | 0.02              | NONE              |                    |                   |
| 2                                          | M5              | No    | 0.672              | 0.02              | M4                | 0.555              | 0.02              |
| 3                                          | М3              | No    | 0.488              | 0.02              | M4                | 0.555              | 0.02              |
| 4                                          | M2              | No    | 0.445              | 0.018             | М3                | 0.488              | 0.02              |
| 5                                          | M1              | No    | 0.41               | 0.02              | M2                | 0.445              | 0.018             |
| 6                                          | M6              | No    | 0.746              | 0.015             | NONE              |                    |                   |
| 7                                          | M7              | Yes   | 0.865              | 0.039             | NONE              | 2.                 |                   |
| 8                                          | M9              | No    | 1.378              | 0.015             | NONE              |                    |                   |
| 9                                          | M10             | Yes   | 1.61               | 0.06              | NONE              |                    |                   |
| 10                                         | M8              | Yes   | 1.24               | 0.02              | M10               | 1.61               | 0.06              |
| 11                                         | M11             | No    | 2.25               | 0.05              | M10               | 1.61               | 0.06              |
| 12                                         | M13             | Yes   | 4.05               | 0.155             | NONE              |                    |                   |
| 13                                         | M12             | Yes   | 3.7                | 0.18              | NONE              | 4.05               | 0.155             |
| 14                                         | 14              | Yes   | 3.74               | 0.038             | M12               | 3.7                | 0.18              |
| 15                                         | M16             | Yes   | 12.01              | 0.95              | NONE              |                    |                   |
| 16                                         | M15             | Yes   | 10.7625            | 1.00              | NONE              |                    |                   |
| 17                                         | M14             | Yes   | 9.55               | 0.30              | M15               | 10.7625            | 1.00              |
| 18                                         | 15              | Yes   | 11.45              | 1.90              | M15               | 10.7625            | 1.00              |
| 19                                         | l1              | No    | 0.64               | 0.08              | NONE              |                    |                   |
| 20                                         | 12              | No    | 0.865              | 0.039             | l1                | 0.64               | 0.08              |
| 21                                         | 13              | No    | 1.61               | 0.06              | 12                | 0.865              | 0.039             |
| 22                                         | DNB             | Yes   | 0.70               | 0.40              | NONE              |                    |                   |

# Table 4.4.7 VIIRS SCIENCE DATA PACKET BAND TRANSMISSION & PROCESSING ORDER

## Table 4.4.8 VIIRS Processing Summary for Differential Encoding

| Band(s)                | A (14 bits)                  | B (14 bits)                 | C (15 bits)               |
|------------------------|------------------------------|-----------------------------|---------------------------|
| M16                    | M16A                         | M16B                        | C = (A + B)/2 + L.E. zero |
| Dual gain (Non-Pred)   | 2 <sup>14</sup> -1           | Data + (2 <sup>14</sup> -1) | C = B - A + L.E. zero     |
| Dual gain (Pred)       | Pred (Ref Band)              | Data + (2 <sup>14</sup> -1) | C = B - A + L.E. zero     |
| Single gain (Non-Pred) | 2 <sup>14</sup> -1 (14 bits) | Data + (2 <sup>14</sup> -1) | C = B - A + L.E. zero     |
| Single gain (Pred)     | Pred (Ref Band)              | Data + (2 <sup>14</sup> -1) | C = B - A + L.E. zero     |

A, B & C relate to points in Figure 4.4-6

Lossless compression is performed on the data from all science data bands. Note that for some bands, the actual band data is compressed; for others differential data is compressed. Data is compressed by aggregation zone. Thus, since there are 6 aggregation zones per scan, there will be 6 sets of compressed data per scan for each detector. Table 4.4.9 shows the Universal Source Encoder for Space (USES, see ref. u in Section 2.2) compression algorithm parameters that are used to process the data.

| USES Parameter | Value            | Units                |
|----------------|------------------|----------------------|
| J              | 8                | Samples per block    |
| N              | 15               | Bits per sample      |
| Mode           | Nearest_neighbor | -                    |
| BlkRef         | 128              | Blocks per reference |

 Table 4.4.9 VIIRS USES COMPRESSION INFORMATION

Figure 4.4-9 shows the flow diagram for reconstructing the bands from the transmitted differential values. For reference, VIIRS band processing flow bands processed at night are shaded. The band reconstruction process is the same for day and night however.

There is one subtlety of the reconstruction process that is not clearly shown in Figure 4.4-9. This is the processing required when a moderate resolution band is used to reconstruct an imaging band. This is accomplished by "reusing" one moderate resolution band sample to reconstruct four nearest neighbor samples of the imaging band as shown in Figure 4.4-10.





Figure 4.4-10 VIIRS RECONSTRUCTION OF IMAGING BANDS THAT HAVE MODERATE RESOLUTION BANDS AS PREDICTORS

#### 4.4.7.1.4 Operational Mode Arithmetic Operations

In addition to aggregation and bow tie deletion, Figure 4.4-6 also shows arithmetic operations associated with the processing of science data. The digital data representing single-gain spectral bands are processed differently from dual-gain band data. The first step for both types is to convert the 2's complement numbers into 14-bit straight binary form.

After aggregation and bow tie deletion, the single gain band 16 bit words are then truncated to 12 bits and two leading-edge zeros are added, giving 14-bit binary values, which are input to the differential encoding and compression functions.

After conversion from 2's complement form to straight binary, the data from dual-gain spectral bands are merged with the stream of "gain bits" from the focal plane array (FPA) that indicate whether each sample was taken in the high or low gain state. The gain bit is appended as a Most Significant Bit (MSB) to the beginning of each data word, yielding a 15-bit binary value. This has the effect of creating a discontinuous piecewise-linear relationship between radiance and the digital value. Because the discontinuity would reduce the efficiency of the subsequent data compression process, a constant is then subtracted from all the data words in the upper portion of the radiance range. The value subtracted for each spectral band, one of seven in the Discontinuity Offset Registers referred to in the Band Control Word of the first packet, does not totally eliminate the discontinuity, but does reduce its magnitude. This discontinuity constant is not subtracted are stored in the uploadable/downloadable DPP Register Initialization Table (VIIRS Table ID 7). The constants are available on the MSD server. Figure

4.4-11 graphically shows the piecewise linear function that results from gain changes in the dual gain bands. The term DN (Digital Number) used in the figure refers to the binary value of the data.



#### Figure 4.4-11 VIIRS PIECEWISE LINEAR FUNCTION RESULTING FROM DUAL GAIN PROCESSING & OFFSET REQUIRED FOR CORRECTION OF DATA

After bow tie deletion, the 15-bit data values are then truncated to 13 bits, so that both single- and dual-gain band data is passed to the differential encoding (described above) and compression functions as 14-bit binary words.

## 4.4.7.1.5 Operational Mode Packet Processing

As mentioned, there is one grouped science data packet per band. The structures of the grouped packets for APIDs 800 to 823 are shown in Figure 4.4-15, Figure 4.4-16 and Figure 4.4-17. The fields of the User Data Field are described below in Table 4.4.10 and Table 4.4.11. The fields needing additional description for packet processing are discussed below.

The first CCSDS packet of the group contains meta-data characterizing the scan and band. Its Secondary header indicated the number of packet to follow, equal to the number of detectors in the band. The Middle and Last science data CCSDS packets contain 6 subfields of data each containing the compressed pixels from one of the 6 aggregation zones associated with a scan. These data subfields are denoted as "Aggr N" on the packet diagrams.

After compression, as part of the processing to build the above subfields, 1 to 31 bits having value 0 are appended to the compressed data to make the total length of the

compressed "Aggr N" subfield a multiple of 32 bits. The number of bits appended can be determined by using the "Fill Data Word" in the HRD middle and last packets. See Table 4.4.11 for a description of "Fill Data Word". Prior to decompression, the appended bits must be removed from the data or the decompression will be incorrect. The length of the "Aggr N" zone is determined by the Checksum Offset field, immediately preceding the "Aggr N" data. The Checksum field (a 32-bit XOR of the data) and fixed-pattern Sync Word field follow each "Aggr N" zone. These five fields repeat six times in each Middle and Last of the grouped science packets. The value in the checksum offset field is always equal to the length of the aggregation field in bytes, plus 4. For the special case of bowtie deletion, the checksum offset field contains the value 8, namely, the 4 bytes representing the empty aggregation field, plus 4.

The process for extracting data from the HRD packets when the instrument is in Operational Mode is shown in Figure 4.4-12.



Figure 4.4-12 VIIRS PROCESSING FLOW FOR EXTRACTION OF OPERATIONAL MODE DATA FROM SCIENCE DATA PACKETS

## 4.4.7.1.6 Day/Night Band Processing

Although there are significant differences between the DNB and the other bands at the lowest levels of the instrument (focal plane, sub pixel, and front-end electronics), at the packet level, the DNB is actually very similar to the other bands. DNB data are output in APIDs 821-823. The three APIDs correspond to different gain settings of the 16 DNB detectors. The output pixels from each detector corresponding to a scan are placed in a grouped packet that has the same structure as the science data packets for the other bands, described in Figure 4.4-15 to Figure 4.4-17, Table 4.4.10 and Table 4.4.11.

The number of DNB pixels per scan in Operational Mode is equal to 4064. A scan is broken up into six "aggregation" zones as is done for the other bands. The lengths of the aggregation zones, shown in Figure 4.4-13, are unique to the DNB. In Operational mode, the pixels within an aggregation segment are compressed in the same manner as described for the other bands. Although it is not relevant to processing the packets, for completeness, Table 4.4.18 shows how the six aggregation zones are actually formed from 32 lower-level aggregation zones. The lengths of these lower level zones are determined by the geometry of the DNB focal plane array and parameters including SNR and illumination range. The data used to form the 32 lower level zones are not accessible at the packet level, but are contained in the Day Night Band Aggregation Mode Table (VIIRS Table ID 3).



#### Figure 4.4-13 VIIRS PACKET STRUCTURE & DEFINITION OF TERMS FOR DAY NIGHT BAND (DNB) – OPERATIONAL MODE

Figure 4.4-14 shows, at a top level, the processing for DNB data when the instrument is in Operational Mode.

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Figure 4.4-14 VIIRS DNB PROCESSING FLOW – OPERATIONAL MODE

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First Packet



Figure 4.4-15 VIIRS Science First Packet Format

Middle Packet





## Figure 4.4-17 VIIRS Science Last Packet Format

|           |      |               | Table 4.4.10 VIIRS Science First            | Packe                                                                                                                                                                            | et User Data Fields                                                                                                                                                                                  |
|-----------|------|---------------|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start Bit | Bit  | Mnemonic Name | Description                                 | Units                                                                                                                                                                            | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                                                                                               |
| otart bit | Size |               | Decemption                                  | State Value                                                                                                                                                                      | State Name                                                                                                                                                                                           |
| 0         | 32   | N/A           | VIIRS Sequence Count                        | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 32        | 64   | N/A           | Packet Time                                 | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 96        | 8    | N/A           | Format Version                              | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 104       | 8    | N/A           | Instrument Number                           | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 112       | 16   | N/A           | Spare                                       | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 128       | 1    | N/A           | HAM Side                                    | 0<br>1                                                                                                                                                                           | HAM Side A<br>HAM Side B                                                                                                                                                                             |
| 129       | 1    | N/A           | Scan Synch                                  | 0<br>1                                                                                                                                                                           | Servo OFF<br>Servo ON and Synchronized                                                                                                                                                               |
| 400       |      | N/A           | Self Test Data Pattern                      | 0000 <sub>b</sub><br>0001 <sub>b</sub> -<br>1111 <sub>b</sub>                                                                                                                    | Live Data<br>Test Pattern Data                                                                                                                                                                       |
| 130       | 4    | N/A<br>N/A    | Decement                                    | N/A                                                                                                                                                                              | Ν/Δ                                                                                                                                                                                                  |
| 134       | 32   | N/A           | Keservea<br>Scan number                     | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 176       | 64   | N/A           | Scan Terminus                               | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
|           |      |               | Sensor Mode                                 | 0<br>1<br>2<br>3<br>4<br>5                                                                                                                                                       | LAUNCH<br>ACTIVATION<br>OUTGAS<br>DIAGNOSTIC<br>OPERATIONAL DAY<br>OPERATIONAL NIGHT                                                                                                                 |
| 240       | 8    | N/A           |                                             | 6                                                                                                                                                                                | SAFE                                                                                                                                                                                                 |
| 248       | 8    | N/A           | VIIRS Model                                 | 1<br>2<br>3<br>4                                                                                                                                                                 | EDU Platform<br>FU1<br>FU2<br>FU3                                                                                                                                                                    |
| 050       | 10   | N/A           | FSW Version                                 | 0<br>1<br>2                                                                                                                                                                      | IMPOUND<br>REV A<br>REV B                                                                                                                                                                            |
| 250       | 10   | N/A<br>N/A    | Devel Operative (Moved (DOM)) Dia Effective | 3<br>N/A                                                                                                                                                                         | REV C                                                                                                                                                                                                |
| 272       | 32   | N/A           | Band Control Word (BCW) Bit Field           | N/A                                                                                                                                                                              | N/A                                                                                                                                                                                                  |
| 212       | 3    | 1071          | BCW Dollt Cale                              | 00001                                                                                                                                                                            | DNB                                                                                                                                                                                                  |
| 281       | 5    | N/A           |                                             | 00010<br>00011<br>00100<br>00101<br>00110<br>01000<br>01001<br>01010<br>01010<br>01011<br>01100<br>01111<br>10000<br>10001<br>10010<br>10011<br>10100<br>10101<br>10100<br>10110 | M1<br>M2<br>M4<br>M3<br>11<br>12<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>M16A<br>M16A<br>M16B<br>M16<br>M16<br>M16<br>M16<br>M16<br>M16<br>M16<br>M16<br>M16<br>M14 |
|           |      |               |                                             |                                                                                                                                                                                  |                                                                                                                                                                                                      |

## Table 4.4.10 VIIRS Science First Packet Liser Data Fields

|           | Bit  |               |                                                                 | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |
|-----------|------|---------------|-----------------------------------------------------------------|-------------|--------------------------------------------------------|
| Start Bit | Size | Mnemonic Name | Description                                                     | OR          | OR                                                     |
|           | 0120 |               |                                                                 | State Value | State Name                                             |
|           |      |               | BCW Active/Width Bits                                           | 00          | Inactive                                               |
|           |      |               |                                                                 | 01          | Inactive                                               |
|           |      |               |                                                                 | 10          | Normal                                                 |
| 286       | 2    | N/A           |                                                                 | 11          | Partial                                                |
|           |      |               | BCW ASP Boards                                                  | 00          | DNB                                                    |
|           |      |               |                                                                 | 01          | ASP1                                                   |
|           |      |               |                                                                 | 10          | ASP2                                                   |
| 288       | 2    | N/A           |                                                                 | 11          | ASP3                                                   |
| 290       | 3    | N/A           | BCW ASP Channels                                                | N/A         | N/A                                                    |
|           |      |               | BCW Image/Moderate                                              | 0           | Image                                                  |
| 293       | 1    | N/A           |                                                                 | 1           | Moderate                                               |
| 294       | 1    | N/A           | BCW Stagger (Delay 3 samples for the even number of pixel rows) | N/A         | N/A                                                    |
|           |      |               | BCW Single or multi (dual) band                                 | 0           | Single                                                 |
| 295       | 1    | N/A           |                                                                 |             | Multi                                                  |
|           |      |               | BCW Aggregation                                                 | 0           | No                                                     |
| 296       | 1    | N/A           |                                                                 | 1           | Yes                                                    |
|           |      |               | BCW Bowtie                                                      | 0           | No Bow Tie Deletion                                    |
| 297       | 1    | N/A           |                                                                 | 1           | Bow Tie Deletion Applied                               |
|           |      |               | BCW Save as Predictor or TDI                                    | 0           | No storage done                                        |
| 298       | 1    | N/A           |                                                                 | 1           | Band stored in Scan Predictor RAM                      |
|           |      |               | BCW Spectral DPCM                                               | 0           | No DPCM                                                |
| 299       | 1    | N/A           |                                                                 | 1           | DPCM Performed                                         |
|           |      |               | BCW Dual Out Sum                                                | 0           | No averaging performed                                 |
| 300       | 1    | N/A           |                                                                 | 1           | Current band is averaged with the band                 |
|           |      |               | BCW Discontinuity Correction                                    | 0           | No Discontinuity offset                                |
|           |      |               |                                                                 | 1           | Discontinuity Offset Register 1                        |
|           |      |               |                                                                 | 2           | Discontinuity Offset Register 2                        |
|           |      |               |                                                                 | 3           | Discontinuity Offset Register 3                        |
|           |      |               |                                                                 | 4           | Discontinuity Offset Register 4                        |
|           |      |               |                                                                 | 5           | Discontinuity Offset Register 5                        |
|           |      |               |                                                                 | ě           | Discontinuity Offset Register 6                        |
| 301       | 3    | N/A           |                                                                 | 7           | Discontinuity Offeet Register 7                        |
| 304       | 16   | N/A           | First Sample Count                                              | N/A         | N/A                                                    |
| 320       | 16   | N/A           | Number of Samples                                               | N/A         | N/A                                                    |
| 336       | 960  | N/A           | Rerserved                                                       | N/A         | N/A                                                    |
| 1296      | 16   | N/A           | Check Sum                                                       | N/A         | N/A                                                    |
|           |      |               |                                                                 |             |                                                        |
|           |      |               |                                                                 |             |                                                        |
|           |      |               |                                                                 |             |                                                        |

## Table 4.4.10 VIIRS Science First Packet User Data Fields (cont)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|--------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 32          | N/A           | VIIRS Sequence Count                       | N/A                        | N/A                                                                        | U         |
| 32        | 64          | N/A           | Packet Time                                | N/A                        | N/A                                                                        | U         |
| 96        | 8           | N/A           | Format Version                             | N/A                        | N/A                                                                        | U         |
| 104       | 8           | N/A           | Instrument Number                          | N/A                        | N/A                                                                        | U         |
| 112       | 16          | N/A           | Spare                                      | N/A                        | N/A                                                                        | N/A       |
|           |             |               | Integrity Check                            | 0                          | No Error                                                                   | P         |
| 128       | 1           | N/A           | Indicates Corrupted Detector Data          | 1                          | Error                                                                      | в         |
|           |             |               | Self Test Data Pattern                     | 0000 <sub>b</sub>          | Live Data                                                                  |           |
|           |             |               |                                            | 0001 <sub>b</sub> -        | Test Data patterns                                                         | В         |
| 129       | 4           | N/A           |                                            | 1111 <sub>b</sub>          |                                                                            | 5         |
| 133       | 11          | N/A           | Reserved                                   | N/A                        | N/A                                                                        | N/A       |
|           |             |               | Band                                       |                            |                                                                            |           |
| 144       | 8           | N/A           | Raytheon internal data field.              | N/A                        | N/A                                                                        | N/A       |
| 152       | 8           | N/A           | Detector                                   | 0-31                       | Range for Valid                                                            | U         |
|           |             |               | Sync Word Pattern                          |                            | × ·                                                                        |           |
| 160       | 32          | N/A           | Sync Verify Data Pattern : 0xFF000063      | N/A                        | N/A                                                                        | U         |
| 192       | 512         | N/A           | Reserved                                   | N/A                        | N/A                                                                        | N/A       |
| 704       | 6           | N/A           | Aggregation 1 or 32-17 Fill Data All zeros | N/A                        | N/A                                                                        | N/A       |
| 710       | 5           | N/A           | Aggregation 1 or 32-17 Fill Data reserved  | N/A                        | N/A                                                                        | N/A       |
|           |             |               | Aggregation 1 or 32-17 Fill Data "X" field | 0                          | Last compressed data located in bits 00:15 of last data word               | р         |
| 715       | 1           | N/A           |                                            | 1                          | Last compressed data located in bits 16:31 of last data word               | P         |
| 716       | 4           | N/A           | Aggregation 1 or 32-17 Fill Data undefined | N/A                        | N/A                                                                        | N/A       |
| 720       | 16          | N/A           | Aggregation 1 or 32-17 Check Sum Offset    | N/A                        | N/A                                                                        | U         |
| 736       | varies      | N/A           | Aggregation 1 or 32-17                     | N/A                        | N/A                                                                        | U         |
| varies    | 32          | N/A           | Aggregation 1or 32-17 Check Sum            | N/A                        | N/A                                                                        | U         |
| varies    | 32          | N/A           | Aggregation 1 or 32-17 Sync Word           | N/A                        | N/A                                                                        | U         |
| varies    | 6           | N/A           | Aggregation 2 or 16-10 Fill Data All zeros | N/A                        | N/A                                                                        | N/A       |
| varies    | 5           | N/A           | Aggregation 2 or 16-10 Fill Data reserved  | N/A                        | N/A                                                                        | N/A       |
|           |             |               | Aggregation 2 or 16-10 Fill Data "X" field | 0                          | Last compressed data located in bits 00:15 of last data word               | р         |
| varies    | 1           | N/A           |                                            | 1                          | Last compressed data located in bits 16:31 of last data word               | В         |
| varies    | 4           | N/A           | Aggregation 2 or 16-10 Fill Data undefined | N/A                        | N/A                                                                        | N/A       |
| varies    | 16          | N/A           | Aggregation 2 or 16-10 Check Sum Offset    | N/A                        | N/A                                                                        | U         |
| varies    | varies      | N/A           | Aggregation 2 or 16-10                     | N/A                        | N/A                                                                        | U         |
| varies    | 32          | N/A           | Aggregation 2 or 16-10 Check Sum           | N/A                        | N/A                                                                        | U         |
| varies    | 32          | N/A           | Aggregation 2 or 16-10 Sync Word           | N/A                        | N/A                                                                        | U         |

## Table 4.4.11 VIIRS Science Middle and Last Packet User Data Fields

| Table 4.4.11 | VIIRS Science Middle and Last Packet User Data Field | s (cont) |
|--------------|------------------------------------------------------|----------|
|              |                                                      |          |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                        | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                   | Data Type |
|-----------|-------------|---------------|----------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------|
| varies    | 6           | N/A           | Aggregation 3-Nadir or 9-Nadir Fill Data All zeros | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 5           | N/A           | Aggregation 3-Nadir or 9-Nadir Fill Data reserved  | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 1           | N/A           | Aggregation 3-Nadir or 9-Nadir Fill Data "X" field | 0<br>1                     | Last compressed data located in bits 00:15 of last data word<br>Last compressed data located in bits 16:31 of last data word | В         |
| varies    | 4           | N/A           | Aggregation 3-Nadir or 9-Nadir Fill Data undefined | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 16          | N/A           | Aggregation 3-Nadir or 9-Nadir Check Sum Offset    | N/A                        | N/A                                                                                                                          | U         |
| varies    | varies      | N/A           | Aggregation 3-Nadir or 9-Nadir                     | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 3-Nadir or 9-Nadir Check Sum           | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 3-Nadir or 9-Nadir Sync Word           | N/A                        | N/A                                                                                                                          | U         |
| varies    | 6           | N/A           | Aggregation Nadir-3 or Nadir-9 Fill Data All zeros | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 5           | N/A           | Aggregation Nadir-3 or Nadir-9 Fill Data reserved  | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 1           | N/A           | Aggregation Nadir-3 or Nadir-9 Fill Data "X" field | 0                          | Last compressed data located in bits 00:15 of last data word<br>Last compressed data located in bits 16:31 of last data word | В         |
| varies    | 4           | N/A           | Aggregation Nadir-3 or Nadir-9 Fill Data undefined | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 16          | N/A           | Aggregation Nadir-3 or Nadir-9 Check Sum Offset    | N/A                        | N/A                                                                                                                          | U         |
| varies    | varies      | N/A           | Aggregation Nadir-3 or Nadir-9                     | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation Nadir-3 or Nadir-9 Check Sum           | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation Nadir-3 or Nadir-9 Sync Word           | N/A                        | N/A                                                                                                                          | U         |
| varies    | 6           | N/A           | Aggregation 2 or 10-16 Fill Data All zeros         | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 5           | N/A           | Aggregation 2 or 10-16 Fill Data reserved          | N/A                        | N/A                                                                                                                          | N/A       |
|           |             |               | Aggregation 2 or 10-16 Fill Data "X" field         | 0                          | Last compressed data located in bits 00:15 of last data word                                                                 |           |
| varies    | 1           | N/A           |                                                    | 1                          | Last compressed data located in bits 16:31 of last data word                                                                 | В         |
| varies    | 4           | N/A           | Aggregation 2 or 10-16 Fill Data undefined         | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 16          | N/A           | Aggregation 2 or 10-16 Check Sum Offset            | N/A                        | N/A                                                                                                                          | U         |
| varies    | varies      | N/A           | Aggregation 2 or 10-16                             | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 2 or 10-16 Check Sum                   | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 2 or 10-16 Sync Word                   | N/A                        | N/A                                                                                                                          | U         |
| varies    | 6           | N/A           | Aggregation 1 or 17-32 Fill Data All zeros         | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 5           | N/A           | Aggregation 1 or 17-32 Fill Data reserved          | N/A                        | N/A                                                                                                                          | N/A       |
|           |             |               | Aggregation 1 or 17-32 Fill Data "X" field         | 0                          | Last compressed data located in bits 00:15 of last data word                                                                 |           |
| varies    | 1           | N/A           |                                                    | 1                          | Last compressed data located in bits 16:31 of last data word                                                                 | В         |
| varies    | 4           | N/A           | Aggregation 1 or 17-32 Fill Word Data undefined    | N/A                        | N/A                                                                                                                          | N/A       |
| varies    | 16          | N/A           | Aggregation 1 or 17-32 Check Sum Offset            | N/A                        | N/A                                                                                                                          | U         |
| varies    | varies      | N/A           | Aggregation 1 or 17-32                             | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 1 or 17-32 Check Sum                   | N/A                        | N/A                                                                                                                          | U         |
| varies    | 32          | N/A           | Aggregation 1 or 17-32 Sync Word                   | N/A                        | N/A                                                                                                                          | U         |
| vaires    | 8           | N/A           | Pad byte (as needed)                               | N/A                        | N/A                                                                                                                          | N/A       |
|           |             |               |                                                    |                            |                                                                                                                              |           |
### 21.4.7.2 Calibration Data

The VIIRS Calibration Packet (APIDs 825 and 855) contain sensor outputs from the Space, Blackbody and Solar Diffuser Views during the VIIRS scan. Both APIDs are grouped packets containing the calibration data for all bands. VIIRS outputs one grouped packet every scan (1.7864 sec). If VIIRS is in Operational Mode it outputs APID 825 but if VIIRS is in Diagnostic Mode it outputs APID 855. The APIDs are the same, except that the data are compressed in the Operational modes and are not compressed in Diagnostic mode.

An overview of the organization of the Calibration packet is shown in the Figure 4.4-18. More detailed structure diagrams are in Figure 4.4-23, Figure 4.4-24 and Figure 4.4-25 and detailed User Data Field listing is shown in Table 4.4.13 and Table 4.4.14. The first CCSDS packet in the grouped packet contains metadata. The 22 Middle CCSDS packets and one Last CCSDS packet each contain the calibration data for one of the 23 bands. The packet contains data from 16 or 32 detectors per band, viewing all three calibration sources (space view, blackbody, and solar diffuser). Regardless of whether VIIRS is in the day or night portion of its orbit, the calibration packet format is the same. The only difference between day and night mode band content is that two day mode Moderate bands (M4 and M5) are replaced occasionally by command (SET DP DN M L GAIN PKTS) with Mid and Low Gain DNB Stages (DNBMGS and DNBLGS) in night mode, as shown in Table 4.4.12. In both day and night modes, M16A and M16B are both transmitted as separate bands (without TDI) in the calibration packets for all operating modes. Calibration dual-gain detector data does not have the discontinuity constant subtracted.

Within a middle or last CCSDS packet the data is ordered by detector and, then by view (Space, Blackbody, or Solar Diffuser) as shown in Figure 4.4-18. The length of all views for moderate bands is 48 samples, imaging bands is 96. The DNB calibration data consists of 16 samples from each of the four gain stages, making a total of 64 samples in each view. The order of the DNB stages in the packet is HGA, HGB, MGS, LGS. If the DNB is in aggregation mode 35 or 36, then only 4 samples are reported in each stage for a total of 16 samples per view. There is no specific telemetry point that identifies what DNB aggregation mode is being transmitted in calibration view. Aggregation modes 35 and 36 send only 16 samples of data and can be used to sync the processing to where the VIIRS system is in the aggregation mode sequence. VIIRS changes the DNB aggregation mode every two scans and cycles through all modes in 72 scans. The sample length of all views is fixed and not programmable in software. The calibration view data (SV, BB, SD) have 14 significant bits preceded by a MSB of zero for 15 bits per sample. The value in the checksum offset field is equal to the length of the corresponding view field in bytes, plus 4.

When the instrument is in Operational Mode, the samples representing the output from each view are compressed as individual blocks of data using the USES algorithm. The details of compression and decompression of calibration data are nearly the same as for the science data packet and are shown graphically in Figure 4.4-19. One significant difference is the discontinuity constant is not subtracted from dual-gain detector outputs in calibration mode. As shown in Figure 4.4-18 and Figure 4.4-19, compression is performed at the view level. After each view is compressed, zeros are appended to make the length of the compressed data a multiple of 32. Before decompression, these

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

appended zeros must be removed. The Number of Fill Bits field associated with each view contains the number of zeros appended to the data after compression.

|             | Band | Conten | t/Mode |          |          |          |         |          |          | [8]       | [9]      |
|-------------|------|--------|--------|----------|----------|----------|---------|----------|----------|-----------|----------|
| Band        |      |        | tic    | No. Zero | No. Gain | No. Bits | Total   | No. Gain | No.      | No.       | No.      |
|             |      | [6]    | ost    | Bits     | Bits     | for Data | Number  | Settings | Dets/Ban | Bits/Word | Samples/ |
|             | ~    | ht     | uĝu    |          |          | Number   | of Bits |          | d        |           | View     |
|             | Da   | Niç    | Dia    |          |          |          |         |          |          |           |          |
| M1          | х    | х      | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M2          | х    | х      | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M3          | х    | х      | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M4          | х    |        | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M5          | х    |        | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M6          | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16 💽     | 14        | 48       |
| M7          | х    | х      | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M8          | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M9          | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M10         | х    | х      | х      | 1        | 0        | 14       | 15      | 1 4      | 16       | 14        | 48       |
| M11         | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M12         | х    | х      | х      | 1        | 0        | 14       | 15      |          | 16       | 14        | 48       |
| M13         | Х    | х      | х      | 0        | 1        | 14       | 15      | 2        | 16       | 15        | 48       |
| M14         | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M15         | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M16A        | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| M16B        | х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 16       | 14        | 48       |
| 1           | Х    | х      | х      | 1        | 0        | 14       | 15      | 1        | 32       | 14        | 96       |
| 12          | Х    | Х      | Х      | 1        | 0        | 14       | 15      | 1        | 32       | 14        | 96       |
| 13          | X    | Х      | X      | 1        | 0        | 14       | 15      | 1        | 32       | 14        | 96       |
| 14          | X    | X      | X      | 1        | 0        | 14       | 15      | 1        | 32       | 14        | 96       |
|             | X    | X      | X      |          | U        | 14       | 15      | 1        | 32       | 14        | 96       |
|             |      |        |        |          |          | -        |         |          |          |           |          |
| stanes      |      |        |        |          |          |          |         |          |          |           | 64 or 16 |
| transmitte  |      |        |        |          |          |          |         |          |          |           |          |
| d in        | х    | х      | х      | 1        | 0        | 14       | 15      | NA       | 16       | 15        | Modes    |
| single      |      |        |        |          |          |          |         |          |          |           | 34/35)   |
| band        |      |        |        |          |          |          |         |          |          |           | ,        |
| packet      |      |        |        |          |          |          |         |          |          |           |          |
| DNB MGS     |      |        |        |          |          |          |         |          |          |           | -        |
| [10]        |      | х      | - x    | 1        | 0        | 14       | 15      | NA       | 16       | 15        | 64       |
| All Data is |      |        |        |          |          |          |         |          |          |           |          |
| DNB LGS     |      |        |        |          |          |          |         |          |          |           |          |
| [10]        |      |        |        |          |          |          |         |          |          |           |          |
| All data is |      |        |        |          |          |          | 4 -     |          | 10       | 45        |          |
|             |      | ×      | ×      | 1        | 0        | 14       | 15      | NA       | 16       | 15        | 64       |
| high        |      |        |        |          |          |          |         |          |          |           |          |
| rad/low     |      |        |        |          |          |          |         |          |          |           |          |
| gain        |      |        |        |          |          |          |         |          |          |           |          |

Table 4.4.12 VIIRS Gain, Detector, and Bit Summary for Calibration Data

### Notes

[8] Column 8 indicates meaningful band bits before compression & after ground data recovery. For the dual gain bands (bold in the table), the following logic applies to the gain bit. If the gain bit = 0, this is a HIGH State. If the gain bit = 1, this is a LOW State. All DNB bands above Stage 1 are the most significant bit of the 14 bit value.
[9] The number of samples per view for the DNB band is 64 except for Aggregation Modes 34 and 35 when it is 16. The DNB aggregation mode in the cal view changes every 2 scans, cycling over agg. modes 1 to 36 in 72 scans.

Calibration Packet is a CCSDS Segmented Packet Whose Structure is Similar to HRD Packets, Except Middle and Last Packets are Organized by Band (vs. Detector for HRD)





are variable because of compression

### Figure 4.4-19 VIIRS Top-Level Format of Detector Field in Calibration Packet – Operational Mode

When the instrument is in Diagnostic mode, no compression is performed on the data. The length of each data word is 15 bits. The total length of the subfield containing the data from a view, in bits, is equal to 15 times the number of samples in the view. All data is packed.

The order of data is the same for Diagnostic mode as Operational Mode. Zeros are appended to the end of the data in each view to make the length of the view, in bits, a multiple of 32. The appended zeros should be removed as part of the depacketization process. The structure of the detector data field in the calibration packet for Diagnostic mode is shown in Figure 4.4-20.



### Figure 4.4-20 VIIRS Top-Level Format of Detector Data Field in Calibration Packet – Diagnostic Mode

Top level activity diagrams for processing the Calibration Packets are shown in Figure 4.4-21 and Figure 4.4-22. Figure 4.4-21 shows the processing flow for Operational Mode; Figure 4.4-22 shows the flow for Diagnostic Mode.



Figure 4.4-21 VIIRS Calibration Data Packet Processing – Operational Mode



Figure 4.4-22 VIIRS Calibration Data Packet Processing – Diagnostic Mode



Figure 4.4-23 VIIRS Calibration First Packet Format



# Figure 4.4-24 VIIRS Calibration Middle Packet Format



Calibratio. Figure 4.4-25 VIIRS Calibration Last Packet Format

A.S.

| Start Bit | Bit<br>Size | Mnemonic Name | Description            | Units<br>OR<br>State Value      | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                   | Data Type |
|-----------|-------------|---------------|------------------------|---------------------------------|----------------------------------------------------------------------------------------------|-----------|
| 0         | 32          | N/A           | VIIRS Sequence Count   | N/A                             | N/A                                                                                          | U         |
| 32        | 64          | N/A           | Packet Time            | N/A                             | N/A                                                                                          | U         |
| 96        | 8           | N/A           | Format Version         | N/A                             | N/A                                                                                          | U         |
| 104       | 8           | N/A           | Instrument Number      | N/A                             | N/A                                                                                          | U         |
| 112       | 16          | N/A           | Spare                  | N/A                             | N/A                                                                                          | N/A       |
| 128       | 1           | N/A           | HAM Side               | 0<br>1                          | HAM Side A<br>HAM Side B                                                                     | В         |
| 129       | 1           | N/A           | Scan Synch             | 0                               | Servo OFF<br>Servo ON and Synchronized                                                       | В         |
|           |             |               | Self Test Data Pattern | 0000b                           | Live Data                                                                                    |           |
|           |             |               |                        | 0001b -                         | Test Pattern Data                                                                            | В         |
| 130       | 4           | N/A           |                        | 1111b                           |                                                                                              |           |
| 134       | 10          | N/A           | Reserved               | N/A                             | N/A                                                                                          | N/A       |
| 144       | 32          | N/A           | Scan number            | N/A                             | N/A                                                                                          | U         |
| 176       | 64          | N/A           | Scan Terminus          | N/A                             | N/A                                                                                          | U         |
| 240       | 8           | N/A           | Sensor Mode            | 0<br>1<br>2<br>3<br>4<br>5<br>6 | LAUNCH<br>ACTIVATION<br>OUTGAS<br>DIAGNOSTIC<br>OPERATIONAL DAY<br>OPERATIONAL NIGHT<br>SAFE | В         |
| 248       | 8           | N/A           | VIIRS Model            | 1<br>2<br>3<br>4                | EDU Platform<br>FU1<br>FU2<br>FU3                                                            | В         |
| 256       | 16          | N/A           | FSW Version            | 0<br>1<br>2<br>3                | IMPOUND<br>REV A<br>REV B<br>REV C                                                           | В         |
| 272       | 32          | N/A           | FSW Diagnostic         | N/A                             | N/A                                                                                          | N/A       |
| 304       | 896         | N/A           | Reserved               | N/A                             | N/A                                                                                          | N/A       |
| 1200      | 16          | N/A           | Check Sum              | N/A                             | N/A                                                                                          | U         |
|           |             |               |                        |                                 |                                                                                              |           |

### Table 4.4.13 VIIRS Calibration First Packet User Data Fields

|           | Bit  |               |                                                                                           | Units                                                                                                                                                                                                               | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                                                                            |           |
|-----------|------|---------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name | Description                                                                               | OR                                                                                                                                                                                                                  | OR                                                                                                                                                                                | Data Type |
|           |      |               |                                                                                           | State Value                                                                                                                                                                                                         | State Name                                                                                                                                                                        |           |
| 0         | 32   | N/A           | VIIRS Sequence Count                                                                      | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | U         |
| 32        | 64   | N/A           | Packet Time                                                                               | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | U         |
| 96        | 8    | N/A           | Format Version                                                                            | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | U         |
| 104       | 8    | N/A           | Instrument Number                                                                         | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | U         |
| 112       | 16   | N/A           | Spare                                                                                     | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | N/A       |
|           |      |               | Integrity Check                                                                           | 0                                                                                                                                                                                                                   | No Error                                                                                                                                                                          | в         |
| 128       | 1    | N/A           | Indicates Corrupted Detector Data                                                         | 1                                                                                                                                                                                                                   | Error                                                                                                                                                                             | 5         |
|           |      |               | Self Test Data Pattern                                                                    | 0000 <sub>b</sub>                                                                                                                                                                                                   | Live Data                                                                                                                                                                         |           |
|           |      |               |                                                                                           | 0001 <sub>b</sub> -                                                                                                                                                                                                 | Test Data patterns                                                                                                                                                                | В         |
| 129       | 4    | N/A           |                                                                                           | 1111 <sub>b</sub>                                                                                                                                                                                                   |                                                                                                                                                                                   |           |
|           |      |               | Reserved                                                                                  |                                                                                                                                                                                                                     |                                                                                                                                                                                   |           |
| 133       | 11   | N/A           | Reserved Field Filled with Zeros                                                          | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | N/A       |
|           |      |               | Band                                                                                      |                                                                                                                                                                                                                     |                                                                                                                                                                                   | NUA       |
| 144       | 8    | N/A           | Raytheon internal data field.                                                             | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | N/A       |
|           |      |               | Samples per View                                                                          |                                                                                                                                                                                                                     | N                                                                                                                                                                                 |           |
|           |      |               | Samples per View parameter: 48. Re: EDD154640-101, Section A.10 "Calibration Data Packet" |                                                                                                                                                                                                                     |                                                                                                                                                                                   | U         |
| 152       | 8    | N/A           |                                                                                           | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               |           |
|           |      |               | Sync Word Pattern                                                                         |                                                                                                                                                                                                                     |                                                                                                                                                                                   | 11        |
| 160       | 32   | N/A           | Sync Verify Data Pattern : 0xFF000063                                                     | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | 0         |
|           |      | N/4           | Reserved                                                                                  |                                                                                                                                                                                                                     | 11/4                                                                                                                                                                              | N/A       |
| 192       | 512  | N/A           | Filled with Zeros                                                                         | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               | 1073      |
| /04       | 32   | N/A           | Band Control Word (BCW) Bit Field                                                         | N/A                                                                                                                                                                                                                 | N/A                                                                                                                                                                               |           |
| /04       | 9    | N/A           | BCW Don't Care                                                                            | IN/A                                                                                                                                                                                                                | N/A<br>DNR                                                                                                                                                                        | N/A       |
|           |      |               | BCW Band ID                                                                               | 00001                                                                                                                                                                                                               | DNB<br>M1                                                                                                                                                                         |           |
|           |      |               |                                                                                           | 00010                                                                                                                                                                                                               | M2                                                                                                                                                                                |           |
|           |      |               |                                                                                           | 00011                                                                                                                                                                                                               | MA                                                                                                                                                                                |           |
|           |      |               |                                                                                           | 00100                                                                                                                                                                                                               | M3                                                                                                                                                                                |           |
|           |      |               |                                                                                           | 00101                                                                                                                                                                                                               | 11                                                                                                                                                                                |           |
|           |      |               |                                                                                           | 00110                                                                                                                                                                                                               |                                                                                                                                                                                   |           |
|           |      |               |                                                                                           | 00110                                                                                                                                                                                                               | 2                                                                                                                                                                                 |           |
|           |      |               |                                                                                           | 00110<br>00111<br>01000                                                                                                                                                                                             | 12<br>M7                                                                                                                                                                          |           |
|           |      |               |                                                                                           | 00110<br>00111<br>01000<br>01001                                                                                                                                                                                    | 12<br>M7<br>M5                                                                                                                                                                    |           |
|           |      |               |                                                                                           | 00110<br>00111<br>01000<br>01001<br>01010                                                                                                                                                                           | 12<br>M7<br>M5<br>M6                                                                                                                                                              |           |
|           |      |               | TELON -                                                                                   | 00110<br>00111<br>01000<br>01001<br>01010<br>01011                                                                                                                                                                  | 12<br>M7<br>M5<br>M6<br>M13                                                                                                                                                       |           |
|           |      |               | THE PARTY OF LEVEL                                                                        | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01010                                                                                                                                                         | 12<br>M7<br>M5<br>M6<br>M13<br>M12                                                                                                                                                | В         |
|           |      |               | THE PARTY OF LEVEL                                                                        | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101                                                                                                                                                | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4                                                                                                                                          | в         |
|           |      |               | REAL PROPERTY OF LEGAL                                                                    | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01101                                                                                                                                       | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13                                                                                                                                    | в         |
|           |      |               | A BUILSON                                                                                 | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01110<br>01111                                                                                                                              | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10                                                                                                                             | В         |
|           |      |               | TO BUILSION                                                                               | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01110<br>01111<br>10000                                                                                                                     | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11                                                                                                                      | В         |
|           |      |               | I ORINA ON .                                                                              | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01110<br>01111<br>10000<br>10001                                                                                                            | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4<br>I3<br>M10<br>M11<br>M8                                                                                                                | В         |
|           |      |               | A THO BUT ISHON                                                                           | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01110<br>01111<br>10000<br>10001<br>10010                                                                                                   | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M11<br>M8<br>M9                                                                                                   | В         |
|           |      |               | ALLO BUILSION                                                                             | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01111<br>10000<br>10001<br>10010                                                                                                            | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M11<br>M8<br>M9<br>15                                                                                             | в         |
|           |      |               | TOHO BUILDON                                                                              | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01111<br>10000<br>10001<br>10011<br>10010                                                                                                   | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4<br>I3<br>M10<br>M11<br>M8<br>M9<br>I5<br>N16A                                                                                            | В         |
|           |      |               |                                                                                           | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01111<br>10000<br>10001<br>10010<br>10011<br>10100                                                                                          | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4<br>I3<br>M10<br>M11<br>M8<br>M9<br>I5<br>M16A<br>M18<br>M18                                                                              | В         |
|           |      |               | CHOLIO BUILDON                                                                            | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01111<br>01100<br>10001<br>10010<br>10010<br>10101<br>10110                                                                                          | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>M16A<br>M16B<br>M15                                                                             | В         |
| 713       | 5    | N/A           | THOILD BUILDING .                                                                         | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01110<br>01111<br>10000<br>10011<br>10010<br>10011<br>10100<br>10111<br>01111                                                               | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4<br>I3<br>M10<br>M11<br>M11<br>M8<br>M9<br>I5<br>I5<br>M16A<br>M16A<br>M16B<br>M15<br>M14                                                 | В         |
| 713       | 5    | N/A           | BCW - Active/Width Bits                                                                   | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01111<br>00001<br>10001<br>10011<br>10100<br>10101<br>10110<br>001111<br>000                                                                | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>M16A<br>M16B<br>M15<br>M14                                                                      | В         |
| 713       | 5    | NA            | BCW – Active/Width Bits                                                                   | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01111<br>10000<br>10001<br>10010<br>10010<br>10101<br>10110<br>10111<br>0010                                                                | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>I4<br>I3<br>M10<br>M11<br>M8<br>M9<br>I5<br>M16A<br>M16A<br>M16B<br>M15<br>M14<br>Inactive<br>Inactive                                      | В         |
| 713       | 5    | N/A           | BCW Active/Width Bits                                                                     | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01101<br>0001<br>10011<br>10010<br>10011<br>10110<br>10111<br>0010<br>10111<br>0010                                                         | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>M16A<br>M16B<br>M15<br>M16B<br>M15<br>M14<br>Inactive<br>Inactive<br>Normal<br>Pertice          | В         |
| 713       | 5    | N/A<br>N/A    | BCW - Active/Width Bits                                                                   | 00110<br>00111<br>01000<br>01001<br>01010<br>01011<br>01100<br>01101<br>01100<br>10011<br>10010<br>10011<br>10100<br>10011<br>10110<br>10111<br>0010<br>10111<br>10110<br>10111<br>10110<br>10111<br>10111<br>10111 | 12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>5<br>M16A<br>M16B<br>M15<br>M15<br>M14<br>Inactive<br>Inactive<br>Inactive<br>Normal<br>Partial | В         |

### Table 4.4.14 VIIRS Calibration Middle and Last Packet User Data Fields

|           |        | -                                     |                                                                 | -                |                                                              |           |
|-----------|--------|---------------------------------------|-----------------------------------------------------------------|------------------|--------------------------------------------------------------|-----------|
|           |        |                                       |                                                                 | Units            | Conversion Coefficients (formula or C5, C4, C3, C2, C1, C0)  |           |
| Start Bit | Bit    | Mnemonic Name                         | Description                                                     | OR               | OR                                                           | Data Type |
|           | Size   |                                       | ·                                                               | State Value      | State Name                                                   |           |
|           |        |                                       | BCW ASP Boards                                                  | 00               | DNB                                                          |           |
|           |        |                                       |                                                                 | 01               | ASP1                                                         |           |
|           |        |                                       |                                                                 | 10               | ASP2                                                         | в         |
| 720       | 2      | N/A                                   |                                                                 | 11               | ASP3                                                         |           |
| 722       | 3      | N/A                                   | BCW ASP Channels                                                | N/A              | N/A                                                          | N/A       |
|           |        |                                       | BCW Image/Moderate                                              | 0                | Image                                                        | в         |
| 725       | 1      | N/A                                   |                                                                 | 1                | Moderate                                                     | 5         |
| 726       | 1      | N/A                                   | BCW Stagger (Delay 3 samples for the even number of pixel rows) | N/A              | N/A                                                          | N/A       |
| 707       |        | NIA                                   | BCW Single or multi (dual) band                                 | 0                | Single                                                       | в         |
| /2/       | 1      | N/A                                   | 2011 1 4                                                        | 1                | Na                                                           |           |
| 700       | 4      | N/A                                   | BCW Aggregation                                                 | 0                | NU<br>Vec                                                    | В         |
| 120       |        | N/A                                   | DOW Dautia                                                      | 1                | No Bow Tie Deletion                                          |           |
| 720       | 1      | N/A                                   | BCW Bowle                                                       | 1                | Bow Tie Deletion Applied                                     | В         |
| 123       |        |                                       | BCW Save as Predictor or TDI                                    | 0                | No storage done                                              |           |
| 730       | 1      | N/A                                   | BOW - Save as Fredicion of TER                                  | 1                | Band stored in Scan Predictor RAM                            | В         |
|           |        |                                       | BCW Spectral DPCM                                               | 0                | No DPCM                                                      |           |
| 731       | 1      | N/A                                   |                                                                 | 1                | DPCM Performed                                               | В         |
|           |        |                                       | BCW Dual Out Sum                                                | 0                | No averaging performed                                       |           |
| 732       | 1      | N/A                                   |                                                                 | 1                | Current band is averaged with the band                       | в         |
|           |        |                                       | BCW Discontinuity Correction                                    | 0                | No Discontinuity offset                                      |           |
|           |        |                                       |                                                                 | 1                | Discontinuity Offset Register 1                              |           |
|           |        |                                       |                                                                 | 2                | Discontinuity Offset Register 2                              |           |
|           |        |                                       |                                                                 | 3                | Discontinuity Offset Register 3                              |           |
|           |        |                                       |                                                                 | 4                | Discontinuity Offset Register 4                              | 0         |
|           |        |                                       |                                                                 | 5                | Discontinuity Offset Register 5                              |           |
|           |        | NVA                                   |                                                                 | 6                | Discontinuity Offset Register 6                              |           |
| /33       | 3      | N/A                                   | Danasé éko fialda kalam bi ékoas                                | 7                | Discontinuity Offset Register 7                              |           |
| veries    | 6      | N/A                                   | Repeat the helds below N times                                  | , where N is the | N/A                                                          | N/A       |
| varies    | 0      | N/A                                   | Fill Data All Zeros                                             | N/A              | Ν/Δ                                                          | N/A       |
| varies    | 5      | N/A                                   | Fill Data reserved                                              | 0                |                                                              | N/A       |
|           |        |                                       |                                                                 | Ŭ                |                                                              |           |
|           |        |                                       |                                                                 | 1                | Last compressed data located in bits 00:15 of last data word | В         |
| varies    | 1      | N/A                                   |                                                                 |                  | Last compressed data located in bits 16:31 of last data word |           |
| varies    | 4      | N/A                                   | Fill Data undefined                                             | N/A              | N/A                                                          | N/A       |
|           |        |                                       | Check Sum Offset [1]                                            |                  |                                                              |           |
| varies    | 16     | N/A                                   | 32 bit Word displacement to Checksum Word                       | N/A              | N/A                                                          | U         |
| varies    | varies | N/A                                   | Compressed Space View [1]                                       | N/A              | N/A                                                          | U         |
|           |        |                                       | Space View Check Sum [1]                                        |                  |                                                              |           |
| varies    | 32     | N/A                                   | DPP Hardware generated Checksum                                 | N/A              | N/A                                                          | U         |
| varies    | 32     | N/A                                   | Space View Sync Verify [1]                                      | N/A              | N/A                                                          | U         |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        |                                       |                                                                 |                  |                                                              |           |
|           |        | · · · · · · · · · · · · · · · · · · · |                                                                 |                  |                                                              |           |

# Table 4.4.14 VIIRS Calibration Middle and Last Packet User Data Fields (cont)

| Start Bit        | Bit<br>Size | Mnemonic Name | Description                                                                         | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                   | Data Type |
|------------------|-------------|---------------|-------------------------------------------------------------------------------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------|-----------|
| varies           | 6           | N/A           | Fill Data All zeros                                                                 | N/A                        | NA                                                                                                                           | N/A       |
| varies           | 5           | N/A           | Fill Data reserved                                                                  | N/A                        | N/A                                                                                                                          | N/A       |
| varies           | 1           | N/A           | Fill Data "X" field                                                                 | 0                          | Last compressed data located in bits 00:15 of last data word<br>Last compressed data located in bits 16:31 of last data word | В         |
| varies           | 4           | N/A           | Fill Data undefined                                                                 | N/A                        | N/A                                                                                                                          | N/A       |
| varies           | 16          | N/A           | Check Sum Offset [1]<br>32 bit Word displacement to Checksum Word                   | N/A                        | N/A                                                                                                                          | U         |
| varies           | varies      | N/A           | Compressed Black Body View [1]                                                      | N/A                        | N/A                                                                                                                          | U         |
| varies           | 32          | N/A           | Black Body View Check Sum [1]<br>DPP Hardware generated Checksum                    | N/A                        | NA                                                                                                                           | U         |
| varies           | 32          | N/A           | Black Body View Sync Verify [1]                                                     | N/A                        | N/A                                                                                                                          | U         |
| varies           | 6           | N/A           | Fill Data All zeros                                                                 | N/A                        | N/A                                                                                                                          | N/A       |
| varies           | 5           | N/A           | Fill Data reserved                                                                  | N/A                        | N/A                                                                                                                          | N/A       |
| varies           | 1           | N/A           | Fill Data "X" field                                                                 | 0                          | Last compressed data located in bits 00:15 of last data word<br>Last compressed data located in bits 16:31 of last data word | В         |
| varies           | 4           | N/A           | Fill Data undefined                                                                 | N/A                        | N/A                                                                                                                          | N/A       |
| varies           | 16          | N/A           | SD View Sync Offset [1]                                                             | N/A                        | N/A                                                                                                                          | U         |
| varies           | varies      | N/A           | Compressed SD View [1]                                                              | N/A                        | N/A                                                                                                                          | U         |
| varies<br>varies | 32<br>32    | N/A<br>N/A    | SD View Check Sum [1]<br>DPP Hardware generated Checksum<br>SD View Sync Verify [1] | N/A<br>N/A                 | N/A<br>N/A                                                                                                                   | U         |
|                  |             | l             | Repeat N times, who                                                                 | ere N is the number        | of detectors for this band                                                                                                   | ×         |
| varies           | 8           | N/A           | Pad byte (as needed)                                                                | N/A                        | N/A                                                                                                                          | N/A       |

### Table 4.4.14 VIIRS Calibration Middle and Last Packet User Data Fields (cont)

Pad byte (as needed)

### 4.4.7.3 Engineering Data

The VIIRS outputs Engineering data once per scan (TBR) in APIDs 826 or 856 in Operational or Diagnostic mode respectively. The two APIDs have identical formats, illustrated in Figure 4.4-26. Table 4.4.15 lists the user data fields for APIDs 826 and 856. The blackbody thermistors (mnemonics ETP\_BB\_1 through ETP\_BB\_6) have special conversion coefficients. The packet values are not converted directly to temperature. The conversion coefficients listed in Table 4.4.15 are used in the following equation after finding the resistance of the thermistor.

T =  $1/[A0 + A1^*ln(Rt) + A2^*ln(Rt)^2 + A3^*ln(Rt)^3]$ , where Rt is in ohms and T is in Kelvin The thermistor resistance is found using the following:

 $1 / R_{Th} = I_o / (V_{off} - (DN / G_{ADC})) - (1 / R_P)$ , where  $R_{Th}$  = Thermistor Resistance ( $\Omega$ )  $I_o$  = 0.0013795 A DN = Digital Number  $G_{ADC}$  = (16384 DN / 5 V)  $V_{off}$  = 4.145 V  $R_P$  = 5000  $\Omega$ 



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| Start Bit | Bit<br>Size | Mnemonic Name           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 22          | S CD SEO ONT            | This is a running total count of all types of packets sent by VIIRS since power on or a 32-bit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                        | NIA                                                                        | U         |
| 32        | 16          | S CP PKT TIME DAY       | Time of day measured in days.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                        | N/A                                                                        |           |
| 48        | 32          | S CP PKT TIME MILLISEC  | Time of day measured in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                        | N/A                                                                        | Ŭ         |
| 80        | 16          | S_CP_PKT_TIME_MICROSEC  | Time of day measured in microseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A                        | N/A                                                                        | U         |
| 96        | 8           | C_CP_FORMAT_VER         | Format version allows for format changes between different VIIRS units or software versions.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A                        | N/A                                                                        | U         |
| 104       | 8           | C_CP_INSTR_NUM          | Indicates which instrument number sent the data. Set to 00000001 for VIIRS EDU, 2 for FU1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | N/A                        | N/A                                                                        | U         |
| 112       | 16          | Byte Fill or Spare Bits | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | N/A       |
| 128       | 16          | C_CP_FSW_VERSION        | Flight software version allows for software changes between different VIIRS units or software<br>versions. Bits 12-15 are instrument: – 3 for EDU, 4 for FU1 Bit 11 is Simulator (1) or not (0).<br>Bits 0-10 are FSW version.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A                        | N/A                                                                        | υ         |
| 144       | 64          | Byte Fill or Spare Bits | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | N/A       |
| 208       | 16          | S_CP_END_SCAN_DAY       | Time captured when the telescope finishes the Earth collection of the scan cycle. Time measured<br>in days.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | N/A                        | N/A                                                                        | U         |
| 224       | 32          | S_CP_END_SCAN_MILLISEC  | Time captured when the telescope finishes the Earth collection of the scan cycle. Time measured<br>in milliseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | U         |
|           |             |                         | Time captured when the telescope finishes the Earth collection of the scan cycle. Time measured                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                            |                                                                            | u         |
| 256       | 16          | S_CP_END_SCAN_MICROSEC  | In microseconds.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A                        | N/A<br>N/A                                                                 |           |
| 212       | 32          | S_CP_SCAN_NUM           | Indicates which scan number vinks is on. Starts at 1 and increases by 1.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0                          | Invalid                                                                    | U         |
|           |             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1 2                        | Activation<br>OG                                                           |           |
|           |             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 3                          | Diagnostic                                                                 | в         |
|           |             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 4                          | OP_D<br>OP_N                                                               | -         |
|           |             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 5                          | Safe                                                                       |           |
| 304       | 4           | S CP SENSOR MODE        | 6 of 9 VIIRS Modes set by 1394A Bus. Mode state chgs after 1st cmd of new mode is issued.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 7                          | Invalid                                                                    |           |
|           |             |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                          | NOT_LOCKED                                                                 | в         |
| 308       | 1           | S_CP_SERVO_LOCKED       | Indicates if the servo is not locked or locked.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1                          | LOCKED                                                                     | в         |
| 309       | 1           | S_CP_HAM_SIDE           | Indicates which side of the HAM you are using.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0<br>1                     | SIDE A<br>SIDE B                                                           | В         |
| 310       | 1           | S_CP_SDSM_ACTIVE        | Indicates if the SDSM is not active or active.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0<br>1                     | NOT_ACTIVE<br>ACTIVE                                                       | В         |
| 311       | 1           | S CP FPA CAL DATA GAIN  | 0=LOW, 1=HIGH                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 0                          | LOW<br>HIGH                                                                | в         |
| 312       | 2           | Byte Fill or Spare Bits | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | N/A       |
|           |             | · ·                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0                          | LIVE                                                                       | P         |
| 314       | 4           | S_CP_SELF_TEST_DATA     | The rest are reserved.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 1                          | TEST_PATTERN_1                                                             | в         |
| 318       | 1           | ES_SE_A_TELEHAM_SCANSYN | SE_A TELE & HAM ready for good scan data with proper relative angle between them                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0<br>1                     | NO_SYNC<br>SYNC                                                            | В         |
|           |             |                         | SE_B TELE & HAM ready for good scan data with proper relative angle between them                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0                          | NO_SYNC                                                                    | в         |
| 319       | 1           | ES_SE_B_TELEHAM_SCANSYN |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1                          | SYNC                                                                       | U         |
| 320       | 1           | Byte Fill or Spare Bits | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | N/A       |
| 321       | 7           | ES_SD_SDSM_MTR_STEP_CNT | SDSM Motor Absolute Step Count. Cmds C_SD06 and C_SD07 move motor CW/CCW by relative<br>steps. SW tracks absolute step count as Step 0=DCR (timy home). Step 28=SDiffuser, and Step<br>67=Sun. SW volls step 96 as return to DCR=Step 0, 360° rotation OK, 3.75°/step. Steps take 12<br>millisec/ea, except last step is 60 millisec. Before Home initialization, Step=127 default but step<br>relation is unknown. When SDSM performs calibration cycle, this telemetry will be one scan<br>delayed compared to the housekeeping packet step count telemetry (LRV 11,004). SDSM detector<br>output in LRVs 11,101=11,140 is synchronized only with the engineering packet SDSM position<br>telemetry (LRVs 31,003 and 31,004). | N/A                        | N/A                                                                        | U         |
| 328       | 40          | Byte Fill or Spare Bits | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | N/A       |
| 368       | 8           | C_DP_REG_TBL_REV        | Indicates which table revision you are on for the DPP register table . Start with 0 and increase by 1.<br>Reboot starts at 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | N/A                        | N/A                                                                        | U         |
| 376       | 8           | C_DP_STATE_TRAN_TBL_REV | Indicates which table revision you are on for the DPP state transition table. Start with 0 and increase by 1. Reboot starts at 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | N/A                        | N/A                                                                        | U         |
| 384       | 8           | C_DP_BAND_PROC_TBL_REV  | Indicates which table revision you are on for the DPP band processing table. Start with 0 and<br>increase by 1. Reboot starts at 0.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A                        | N/A                                                                        | U         |

### Table 4.4.15 VIIRS Engineering Packet User Data Fields

| Start Bit | Bit<br>Size | Mnemonic Name           | Description                                                                                                                   | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR | Data Type |
|-----------|-------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------------|-----------|
|           | 0126        |                         | Indicates which table revision you are on for the DWM heater control table. Start with 0                                      | State Value | State Name                                                   |           |
| 392       | 8           | C_DP_HEAT_CTRL_TBL_REV  | and increase by 1. Reboot starts at 0.                                                                                        | N/A         | N/A                                                          | U         |
| 400       | 8           | C DP MACRO CMD TBL REV  | Indicates which table revision you are on for the macro command table. Start with 0 and<br>increase by 1. Reboot starts at 0. | N/A         | N/A                                                          | U         |
| 409       |             |                         | Indicates which table revision you are on for the critical telemetry table. Start with 0 and                                  | N/A         | NIA                                                          |           |
| 400       | 0           | C_DF_CRIT_TELE_TBL_REV  | Indicates which table revision you are on for the stored command table. Start with 0 and                                      | 19/25       |                                                              | 0         |
| 416       | 16          | C_DP_STOR_CMD_TBL_REV   | increase by 1. Reboot starts at 0.<br>Indicates occasional selection to send or not send DNB Middle Gain Stage (MGS) & Low    | N/A<br>0    | N/A<br>NOT SEND                                              | U<br>B    |
| 432       | 1           | EC_DP_DN_M_L_GAIN_PKT   | Gain Stage (LGS) Pkts                                                                                                         | 1           | SEND_DNB MGS & LGS                                           | В         |
| 433       | 1           | EC_DP_HRD_PKT_NORM_TEST | Diag modes.)                                                                                                                  | 1           | TEST                                                         | в         |
| 434       | 1           | EC_DP_NONRDT_FPIE_PWR   | 0=PS1, 1=PS2; If FPIE Ok connect to active PS. If fault condition, connect to inactive PS                                     | 0           | PS1<br>PS2                                                   | В         |
| 435       | 1           | EC DP SERVO IN LISE     | ESW echo of C. DP04. Servo in Lise                                                                                            | 0           | SERVO_A<br>SERVO_B                                           | В         |
| 400       |             |                         | Power Supply Section B                                                                                                        | 0           | OFF                                                          | В         |
| 436       | 1           | EC_PS_SEC_B_APFP_ON     | Power Supply Section C                                                                                                        | 0           | ON                                                           | В         |
| 437       | 1           | EC_PS_SEC_C_SE_ON       | Power Supply Section D                                                                                                        | 1           | ON<br>OFF                                                    | B         |
| 438       | 1           | EC_PS_SEC_D_CSOG_ON     |                                                                                                                               | 1           | ON<br>ON                                                     |           |
| 439       | 1           | EC_PS_SEC_E_ISOG_ON     | Power Supply Section E                                                                                                        | 0           | OFF<br>ON                                                    | В         |
| 440       | 1           | EC SE A ANLG PWR ON     | Analog Pwr present on SE A                                                                                                    | 0           | NO_PWR<br>PWR                                                | В         |
|           |             |                         | FSW echoes 2 cmds to indicate driver source for SE_A Mtr Coil (card driver or external                                        | 0           | SC_SAFEHOLD                                                  | В         |
|           |             |                         | is invalid unless one state has been commanded since power up since SW status is lost                                         |             | SE_A_CCA                                                     |           |
| 441       | 1           | EC_SE_A_MTR_COIL_DRIVER | by resets.                                                                                                                    | 0           | NOT STOPPED                                                  | В         |
| 442       | 1           | EC_SE_A_MTRS_STOPPED    | SE_A Motor state                                                                                                              | 1           | STOPPED                                                      |           |
| 443       | 1           | EC_SE_A_TELE_POS_KNOWN  | to speed & controlled)                                                                                                        | 1           | KNOWN                                                        | в         |
| 444       | 1           | EC SE B ANLG PWR ON     | Analog Pwr present on SE B                                                                                                    | 0           | NO_PWR<br>PWR                                                | В         |
|           |             |                         | FSW echoes 2 cmds to indicate driver source for SE_B Mtr Coil (card driver or external                                        | 0           | SC_SAFEHOLD                                                  | В         |
|           |             |                         | is invalid unless one state has been commanded since power up since SW status is lost                                         | '           | SE_B_CCA                                                     |           |
| 445       | 1           | EC_SE_B_MTR_COIL_DRIVER | by resets.                                                                                                                    | 0           | NOT STOPPED                                                  | в         |
| 446       | 1           | EC_SE_B_MTRS_STOPPED    | SE_B Motor state                                                                                                              | 1           |                                                              | D         |
| 447       | 1           | EC_SE_B_TELE_POS_KNOWN  | to speed & controlled)                                                                                                        | 1           | KNOWN                                                        | В         |
|           |             |                         | Earth view DNB Aggregation Mode is to cycle thru 32 modes. Cmd C DP13 allows                                                  | 0<br>1-36   | NORMAL<br>Single Test Modes                                  | U         |
| 448       | 6           | EC_DP_DN_AGGREG_MODE    | forcing it to single test mode                                                                                                | others      | Invalid Values                                               |           |
|           |             |                         | CT and SI) and PS2_A_PWR to CP_BLK_B; XSTRAP connects PS2_A_PWR to                                                            | 0           | NORMAL                                                       |           |
| 454       | 1           | EC_CP_BLK_PWR_SEL       | CP_BLK_A and PS1_A_PWR to CP_BLK_B; also by SC pt-pt 1_SC02                                                                   | 0           | OFF                                                          | B         |
| 455       | 1           | EC_DP_AP_M16_TDI_ON     | Indicates ASP M16 TDI state (M16 is only ASP TDI band)                                                                        | 1           | ON                                                           |           |
| 456       | 16          | EC_DP_SCAN_ENCDR_DELTA  | Scan Encoder Delta shift from normal value D#=0. 14-bits 2's C D# = -8192 to +8191                                            | N/A         | N/A                                                          | U         |
|           |             |                         |                                                                                                                               |             |                                                              |           |

### Table 4.4.15 VIIRS Engineering Packet User Data Fields (cont)

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| Table 4.4.15 | VIIRS Engineering Packet User Data Fields (cont) |
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| Start Bit | Bit<br>Size | Mnemonic Name           | Description                                                                                                                                | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) | Data Type   |
|-----------|-------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------------------------------------------------|-------------|
| 470       |             | D. (. 5'''              | NIA                                                                                                                                        | State Value | State Name<br>DISABLE                                  | в           |
| 472       | ь           | Byte Fill or Spare Bits | IN/A                                                                                                                                       | 1           | DISABLE                                                |             |
| 478       | 1           | EC_DP_AP_SELF_TEST      | DP_AP Self Test State. 0=DISABLE, 1=ENABLE                                                                                                 | 1           | ENABLE                                                 | В           |
|           |             |                         | XS2 NORMAL connects PS1_A_PWR and PS1_C_PWR to Servo_A; and PS2_A_PWR and                                                                  |             |                                                        |             |
| 470       | 1           | EC SE SERVO PWR SEI     | PS2_C_PWR to Servo_B. XS2 XS1 RAP connects PS2_A_PWR and PS1_C_PWR to Servo_A;<br>and PS1_A_PWR and PS1_C_PWR to Servo_B: also by SC nt_nt | 0           | NORMAL                                                 | В           |
| 475       |             |                         |                                                                                                                                            | 0           | AB_STAGE                                               |             |
|           |             |                         |                                                                                                                                            | 1           | A_STAGE                                                | U           |
| 480       | 2           | EC_DP_DNB_1A_1B_STAGE   | What DNB stage 1 data is sent.                                                                                                             | 2           | B_STAGE                                                |             |
| 400       | 1           | EC DR DNR TMC MODE      | DNB Timing mode                                                                                                                            | 0           | NORMAL                                                 | В           |
| 402       |             | EC_DF_DNB_1MG_MODE      | BNB Hining Hode.                                                                                                                           | 0           | DISABLED                                               |             |
| 483       | 1           | EC_DP_DNB_DARK_SUB_CAL  | Dark pixel subtraction for cal views.                                                                                                      | 1           | ENABLED                                                | В           |
|           |             |                         | Deale shart subtraction for Earth along                                                                                                    | 0           | DISABLED                                               | В           |
| 484       | 1           | EC_DP_DNB_DARK_SUB_ETH  | Dark pixel subtraction for Earth views.                                                                                                    | 1           | ENABLED<br>Slow High Resolution Algorithm              |             |
| 485       | 1           | EC AP DC FAST RESTORE   | 1 = DC Fast Low Resolution Restore Algorithm 0 = Slow High Resolution Algorithm                                                            | 1           | DC Fast Low Res Restore Alg                            | В           |
|           |             |                         |                                                                                                                                            | Ó.          | SIDE A                                                 |             |
| 486       | 1           | ES_SE_A_HAM_MIR_SIDE    | SE_A Mirror Side 0=SIDE_A, 1=SIDE_B                                                                                                        | 1           | SIDE B                                                 | в           |
| 407       | 1           | ES SE B HAM MIR SIDE    | SE B Mirror Side 0=SIDE & 1=SIDE B                                                                                                         | 0           | SIDE A                                                 | в           |
| 487       | 16          | ELSE A HAM MTR CURR     | SE_B Milliol Side 0=SIDE_A, 1=SIDE_B                                                                                                       | V V         |                                                        | S (note 1)  |
| 504       | 16          | ELSE_A_TELE_MTR_CURR    | SE A Telescope Motor Current                                                                                                               | V           | 0.00030538.0                                           | S (note 1)  |
| 520       | 16          | EI SE B HAM MTR CURR    | SE B Half Angle Mirror Motor Current                                                                                                       | V           | 0.00030538.0                                           | S (note 1)  |
| 536       | 16          | EI_SE_B_TELE_MTR_CURR   | SE_B Telescope Motor Current                                                                                                               | V           | -, -, -, 0.00030538,0                                  | S (note 1)  |
|           |             |                         |                                                                                                                                            |             |                                                        | S (note 1)  |
| 552       | 16          | EV_CT_PREC_TREF_MUX1CA1 | Precision Thermistor Cal Ref Resistor =4.42Kohm (-20°C Therm 14 equiv)                                                                     | V           | -, -, -, -, -0.0003052, 3.94                           | O (note 1)  |
| 568       | 16          | EV_CT_PREC_TREF_MUX1CA2 | Precision Thermistor Cal Ref Resistor =2.87Kohm (+20°C P_Therm 15 equiv)                                                                   | v           | -, -, -, -0.0003052, 3.94                              | S (note 1)  |
| 584       | 16          | EV CT PREC TREF MUX1CA3 | Precision Thermistor Cal Ref Resistor =1.47Kohm (+50°C P Therm 16 equiv)                                                                   | v           | 0.0003052 3.94                                         | S (note 1)  |
| 600       | 16          | EV_FT_ADC_REF           | FT ADC Ref 5V                                                                                                                              | V           | 0, 0, 0, 0, 3,3575E-04, 0                              | S (note 1)  |
| 616       | 16          | EV_FT_ADC_REF_LW_STPT   | FT ADC Ref LW Setpoint Volt Ref                                                                                                            | V           | 0, 0, 0, 0, 3.0538E-04, 0                              | S (note 1)  |
| 632       | 16          | EV_FT_CKT_GND           | FT Circuit Gnd                                                                                                                             | V           | 0, 0, 0, 0, 3.0538E-04, 0                              | S (note 1)  |
| 648       | 16          | EV_FT_LW_CFPA_HTR_PWR   | FT LW Heater volts                                                                                                                         | V           | 0, 0, 0, 0, 1.2257E-03, 0                              | S (note 1)  |
| 664       | 16          | EV_FT_LW_SETPT_REF      | FT LW SETPT Ref                                                                                                                            | V           | 0, 0, 0, 0, 6.7143E-04, 0                              | S (note 1)  |
| 680       | 16          | EV_FT_SM_CFPA_HTR_PWR   | FT SM Heater volts                                                                                                                         | V           | 0, 0, 0, 0, 1.2257E-03, 0                              | S (note 1)  |
| 696       | 16          | EV_FT_SM_SETPT_REF      | FT SM SETPT Ref                                                                                                                            | V           | 0, 0, 0, 0, 6.7143E-04, 0                              | S (note 1)  |
| 712       | 16          | EV_SE_A_HAM_RATE_ERROR  | SE_A Half Angle Mirror Rate Error                                                                                                          | v           | -, -, -, 0.00030538,0                                  | S (note 1)  |
| 728       | 16          | EV_SE_A_TELE_RATE_ERROR | SE_A Telescope Rate Error                                                                                                                  | v           | -, -, -, 0.00030538,0                                  | S (note 1)  |
| 744       | 10          |                         | CE D Holf Angle Mirror Data Error                                                                                                          | V           | 0.00020528.0                                           | S (note 1)  |
| /44       | 16          | EV_SE_B_HAM_RATE_ERROR  | SE_B Half Angle Mirror Rate Error                                                                                                          | v           | -, -, -, 0.00030538,0                                  | 0 (1.010 1) |
| 760       | 16          | EV_SE_B_TELE_RATE_ERROR | SE_B Telescope Rate Error                                                                                                                  | V           | -, -, -, 0.00030538,0                                  | S (note 1)  |
| 776       | 616         | Byte Fill or Spare Bits | – N/A                                                                                                                                      | N/A         | N/A                                                    | N/A         |
| 1392      | 8           | C_AP_VISNIR_REG_TBL_REV | Indicates which table revision you are on for the VISNIR register table. Start with 0 and increase<br>by 1. Reboot starts at 0.            | N/A         | N/A                                                    | U           |
| 1400      | 8           | C AP SMWIR REG TBL REV  | Indicates which table revision you are on for the SMWIR register table. Start with 0 and increase<br>by 1. Reboot starts at 0.             | N/A         | N/A                                                    | U           |
|           |             |                         | Indicates which table revision you are on for the LWIR register table. Start with 0 and increase by                                        |             |                                                        |             |
| 1408      | 8           | C_AP_LWIR_REG_TBL_REV   | 1. Reboot starts at 0.                                                                                                                     | N/A         | N/A                                                    | U           |
|           |             | - PR                    |                                                                                                                                            |             |                                                        |             |

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| Table 4.4.15 | VIIRS Engineering Packet User Data Fields (cont) |
|--------------|--------------------------------------------------|
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| Start Bit      | Bit<br>Size | Mnemonic Name                              | Description                                                                                                                                                    | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                | Data Type  |
|----------------|-------------|--------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
| 1416           | 8           | C_AP_FPA_IDEAL_TBL_REV                     | Indicates which table revision you are on for the FPA ideal offsets table. Start with 0 and increase<br>by 1. Reboot starts at 0.                              | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1424           | 1           | EC_AP_DC_RESTORE                           | ASP global DC Restore 0=OFF, 1=ON                                                                                                                              | 0<br>1                     | OFF<br>ON                                                                                                                                                                                                 | В          |
| 1425           | 1           | EC_AP_DET_CONNECTED                        | ASP Detector state 0=DISCONNECTED, 1=CONNECTED                                                                                                                 | 0                          | DISCONNECTED                                                                                                                                                                                              | В          |
| 1426           | 6           | EC_AP_LW_IFS_WIDTH                         | Indication of LW imaging integration Ticks by Imaging Frame Sync width. FSW echo, see Cmd<br>C_AP10a description. Useful range in [5]                          | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1432           | 2           | EC_AP_DUAL_GAIN_3_OPS                      | ASP Dual Gain Ops (5 bands). Echos cmd C_AP07 0=AUTO (normal), 1=LOW, 2=HIGH. bb=0, 1, 2, 3 invalid                                                            | 0<br>1<br>2                | AUTO_GAIN<br>LOW GAIN<br>HIGH_GAIN                                                                                                                                                                        | U          |
| 1434           | 6           | EC_AP_LW_RFS_WIDTH                         | Indication of LW radiometric integration Ticks by Radiometric Frame Sync width. FSW echo, see<br>Cmd C_AP10b description. Useful range in [5]                  | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1440           | 2           | EC_AP_FPA_ST_3_OPS                         | ASP FPA Self Test Ops. Echos cmd C_AP05 0=DISABLE (normal state), 1=IMAGING (ST<br>w/Imaging timing), 2=MODERATE (ST w/Moderate timing), bb=0, 1, 2, 3 invalid | 0<br>1<br>2                | IIAGING<br>MODERATE                                                                                                                                                                                       | U          |
| 1442           | 6           | EC_AP_SM_IFS_WIDTH                         | Cmd C_AP13a description.                                                                                                                                       | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1448           | 2           | Byte Fill or Spare Bits                    | IN/A<br>Indication of SM radiometric integration Ticks by Radiometric Frame Sync width. FSW echo. see                                                          | N/A                        | N/A                                                                                                                                                                                                       | N/A        |
| 1450           | 6           | EC_AP_SM_RFS_WIDTH                         | Cmd C_AP13b description. Useful range in [5]                                                                                                                   | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1456           | 2           | Byte Fill or Spare Bits                    | N/A<br>Indication of V/N imaging, integration Tiples by Imaging Frame Syna width, ESIM caba, and Cand                                                          | N/A                        | N/A                                                                                                                                                                                                       | N/A        |
| 1458           | 6           | EC AP VN IFS WIDTH                         | C AP16a description. Useful range in [5]                                                                                                                       | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1464           | 2           | Byte Fill or Spare Bits                    | N/A                                                                                                                                                            | N/A                        | N/A                                                                                                                                                                                                       | N/A        |
| 1466           | 6           | EC_AP_VN_RFS_WIDTH                         | Indication of VN radiometric integration Ticks by Radiometric Frame Sync width. FSW echo, see<br>Cmd C_AP16b description. Useful range in [5]                  | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 1472           | 16          | ETA_FT_LW_CFPA_HI_RSL                      | FT LW CFPA high resolution temperature                                                                                                                         | к                          | 3.550080E-22, 1.694949E-17, 6.302714E-13, 2.640760E-08, 1.215072E-03, 7.834547E+01                                                                                                                        | S (note 1) |
| 1488           | 16          | ETA_FT_LW_CFPA_LO_RSL                      | FT LW CFPA wide range temperature                                                                                                                              | к                          | -8192 to 6559: 1.202715E-18, 1.131951E-14, 1.622151E-11, 2.752477E-07, 4.866753E-03, 7.228128E+01<br>6560 to 8191: 2.022742E-14, -7.169692E-10, 1.017270E-05, -7.218900E-02, 2.561668E+02, -3.634847E+05  | S (note 1) |
| 1504           | 16          | ETA_FT_SM_CFPA_HI_RSL                      | FT SM CFPA high resolution temperature                                                                                                                         | к                          | 3.525489E-22, 1.678993E-17, 6.258779E-13, 2.632508E-08, 1.215080E-03, 7.831462E+01                                                                                                                        | S (note 1) |
| 1520           | 16          | ETA_FT_SM_CFPA_LO_RSL                      | FT SM CFPA wide range temperature                                                                                                                              | к                          | -8192 to 5744: 6.071981E-19, 7.992346E-15, 4.052993E-11, 3.5931823E-07, 4.656636E-03, 7.240609E+01<br>5745 to 8191: 7.649823E-15, -2.571449E-10, 3.457819E-06, -2.323144E-02, 7.796421E+01, -1.044286E+05 | S (note 1) |
| 1536           | 16          | ETA_FT_VIS_NIR_FPA                         | FT VIS/NIR FPA temperature                                                                                                                                     | к                          | 5.383151E-21, 1.423690E-16, 4.063178E-12, 1.389815E-07, 5.172094E-03, 2.670533E+02                                                                                                                        | S (note 1) |
| 1552           | 864         | Byte Fill or Spare Bits                    |                                                                                                                                                                | N/A                        | N/A                                                                                                                                                                                                       | N/A        |
| 2416           | 8           | C_DP_AGGREG_MODE_REV                       | increase by 1. Rebot starts at 0.                                                                                                                              | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 2424           | 8           | C DP THRESHOLD TBL REV                     | 1. Reboot starts at 0.                                                                                                                                         | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 2432           | 8           | C_DP_1A_OFFSETS_TBL_REV                    | Indicates which table revision you are on for the DNB 1A offsets table. Start with 0 and increase<br>by 1. Reboot starts at 0.                                 | N/A                        | N/A                                                                                                                                                                                                       | U          |
|                |             |                                            |                                                                                                                                                                |                            | -8192 to -7615: 3.217360E-15, 1.141519E-10, 1.620545E-06, 1.150208E-02, 4.081410E+01, 5.818346E+04                                                                                                        |            |
| 2440           | 16          | ETA_DP_DNB_CCD                             | DNB CCD Temperature (thermistor)                                                                                                                               | к                          | -7614 to -5329: 1.124727E-16, 3.283012E-12, 3.852489E-08, 2.259396E-04, 6.671666E-01, 1.065072E+03<br>-5328 to 8191: 1.728866E-19, -8.778382E-16, 1.489233E-11, -1.414118E-08, 4.748461E-03, 2.895592E+02 | S          |
| 2456           | 8           | C_DP_1B_OFFSETS_TBL_REV                    | Indicates which table revision you are on for the DNB 1B offsets table. Start with 0 and increase by 1. Reboot starts at 0.                                    | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 2464           | 8           | C_DP_2_OFFSETS_TBL_REV                     | Indicates which table revision you are on for the DNB 2 offsets table. Start with 0 and increase by<br>1. Reboot starts at 0.                                  | N/A                        | N/A                                                                                                                                                                                                       | U          |
| 2472           | 8           | C DP 3 OFESETS TBL REV                     | Indicates which table revision you are on for the DNB 3 offsets table. Start with 0 and increase by<br>1 Reboot starts at 0                                    | N/A                        | N/A                                                                                                                                                                                                       | υ          |
| 2472           | 960         | Byte Fill or Spare Bits                    | N/A                                                                                                                                                            | N/A                        | N/A N/A                                                                                                                                                                                                   | N/A        |
| 3440 -         |             | C_AP_M1_HAM0_DET01 -                       |                                                                                                                                                                |                            |                                                                                                                                                                                                           | U U        |
| 3680<br>3696 - | 16          | C_AP_M1_HAM0_DET16<br>C_AP_M2_HAM0_DET01 - | Indicates the offset values for the FPA electronics.                                                                                                           | N/A                        | N/A                                                                                                                                                                                                       | υ          |
| 3936<br>3952 - | 16          | C_AP_M2_HAM0_DE116<br>C_AP_M3_HAM0_DE101 - | Indicates the offset values for the FPA electronics.                                                                                                           | N/A                        | N/A                                                                                                                                                                                                       | -          |
| 4192           | 16          | C_AP_M3_HAM0_DET16                         | Indicates the offset values for the FPA electronics.                                                                                                           | N/A                        | N/A                                                                                                                                                                                                       | U          |
|                |             |                                            |                                                                                                                                                                |                            |                                                                                                                                                                                                           |            |

| N/A           N/A | N/A           N/A | U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| N/A                                                         | N/A                             | U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                   |
| N/A                                                                                                   | N/A                                                         | U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                        |
| N/A                                                                                                                                             | N/A                                                                                                                 | U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                  |
| N/A                                                                                                                                                                                       | N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A                                                                                                                                                                                       | U<br>U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                            |
| N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A           N/A                                                                                                                                                                                                     | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                      | U<br>U<br>U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                                 |
| N/A           N/A           N/A           N/A           N/A           N/A                                                                                                                                                                                                                                               | N/A<br>N/A<br>N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                             | U<br>U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                                           |
| N/A<br>N/A<br>N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                                                         | N/A<br>N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                                    | U<br>U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                                                |
| N/A<br>N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                                                                | N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                                           | U<br>U<br>U                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| N/A<br>N/A<br>N/A                                                                                                                                                                                                                                                                                                       | N/A<br>N/A                                                                                                                                                                                                                                                                                  | U<br>U                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| N/A<br>N/A                                                                                                                                                                                                                                                                                                              | N/A                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| N/A                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| N/A                                                                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                                                                                                                         | U                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                         | N/A               | N/A         N/A           N/A         N/A |

### Table 4.4.15 VIIRS Engineering Packet User Data Fields (cont)

| Start Bit        | Bit<br>Size  | Mnemonic Name                                  | Description                                                                           | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|------------------|--------------|------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 10608 -<br>10848 | 16           | C_AP_M2_HAM1_DET01 -<br>C_AP_M2_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 10864 -<br>11104 | 16           | C_AP_M3_HAM1_DET01 -<br>C_AP_M3_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 11120 -<br>11360 | 16           | C_AP_M4_HAM1_DET01 -<br>C_AP_M4_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 11376 -<br>11616 | 16           | C_AP_M5_HAM1_DET01 -<br>C_AP_M5_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 11632 -<br>11872 | 16           | C_AP_M6_HAM1_DET01 -<br>C_AP_M6_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 11888 -<br>12128 | 16           | C_AP_M7_HAM1_DET01 -<br>C_AP_M7_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 12144 -<br>12384 | 16           | C_AP_M8_HAM1_DET01 -<br>C_AP_M8_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 12400 -<br>12640 | 16           | C_AP_M9_HAM1_DET01 -<br>C_AP_M9_HAM1_DET16     | Indicates the offset values for the FPA electronics.                                  | N/A                        | Ν/Α                                                                        | U         |
| 12656 -<br>12896 | 16           | C_AP_M10_HAM1_DET01 -<br>C_AP_M10_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 12912 -<br>13152 | 16           | C_AP_M11_HAM1_DE101 -<br>C_AP_M11_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 13168 -<br>13408 | 16           | C_AP_M12_HAM1_DET01 -<br>C_AP_M12_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 13424 -<br>13664 | 16           | C_AP_M13_HAM1_DET01 -<br>C_AP_M13_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 13680 -<br>13920 | 16           | C_AP_M14_HAM1_DE101 -<br>C_AP_M14_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 13936 -<br>14176 | 16           | C_AP_M15_HAM1_DE101 -<br>C_AP_M15_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 14192 -<br>14432 | 16           | C_AP_M16A_HAM1_DE101 -<br>C_AP_M16A_HAM1_DET16 | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 14448 -<br>14688 | 16           | C_AP_M16B_HAM1_DE101 -<br>C_AP_M16B_HAM1_DET16 | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 14704 -<br>14944 | 16           | C_AP_I1E_HAM1_DET01 -<br>C_AP_I1E_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 14960 -<br>15200 | 16           | C_AP_I1O_HAM1_DE101 -<br>C_AP_I1O_HAM1_DE116   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 15216 -<br>15456 | 16           | C_AP_I2E_HAM1_DET01 -<br>C_AP_I2E_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 15472 -<br>15712 | 16           | C_AP_I2O_HAM1_DET01 -<br>C_AP_I2O_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 15728 -<br>15968 | 16           | C_AP_I3E_HAM1_DET01 -<br>C_AP_I3E_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | Ų         |
| 15984 -<br>16160 | 16           | C_AP_I3O_HAM1_DE101 -<br>C_AP_I3O_HAM1_DE112   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 16176 -<br>16224 | 16           | C_AP_I3O_HAM1_DET13 -<br>C_AP_I3O_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 16240 -<br>16480 | 16           | C_AP_I4E_HAM1_DET01 -<br>C_AP_I4E_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 16496 -<br>16736 | 16           | C_AP_14O_HAM1_DE101 -<br>C_AP_14O_HAM1_DE116   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 16752 -<br>16992 | 16           | C_AP_I5E_HAM1_DET01 -<br>C_AP_I5E_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        |                                                                            | U         |
| 17008 -<br>17248 | 16           | C_AP_I5O_HAM1_DET01 -<br>C_AP_I5O_HAM1_DET16   | Indicates the offset values for the FPA electronics.                                  | N/A                        | N/A                                                                        | U         |
| 17264<br>26480   | 9216<br>1536 | S_CP_EVENTS_TABLE<br>Byte Fill or Spare Bits   | A complete dump of the latest events table. There are 64 events each 18 bytes.<br>N/A | N/A<br>N/A                 | N/A<br>N/A                                                                 | U<br>N/A  |
|                  |              |                                                |                                                                                       |                            |                                                                            |           |

### Table 4.4.15 VIIRS Engineering Packet User Data Fields (cont)

| Table 4.4.15 VIIRS Engineering | g Packet User Data Fields (cont) |
|--------------------------------|----------------------------------|
|--------------------------------|----------------------------------|

| Start Bit | Bit<br>Size | Memonic Name            | Description                                                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type  |
|-----------|-------------|-------------------------|-----------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|------------|
| 28016     | 16          | EV AP P30 VISPIN        | VIS/NIR P30 VISPIN backplane source                                                           | V                          | 0, 0, 0, 0, 4, 190E-03, 0                                                  | S (note 1) |
| 28032     | 16          | V_AP_LWIR_ADJ_BIAS_1V   | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 8.057E-04, 0                                                   | S (note 1) |
| 28048     | 16          | V_AP_LWIR_ADJ_BIAS_2V   | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 8.057E-04, 0                                                   | S (note 1) |
| 28064     | 16          | V_AP_LW_VDET_COM1       | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28080     | 16          | V_AP_LW_VDET_COM2       | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28096     | 16          | V_AP_LW_VR_CLAMP        | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28112     | 16          | V_AP_LW_VI_CLAMP        | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28128     | 16          | V_AP_LW_VPO             | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28144     | 16          | V_AP_LW_VNA             | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 7.641E-04, 0                                                   | S (note 1) |
| 28160     | 16          | V_AP_LW_VND             | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 7.641E-04, 0                                                   | S (note 1) |
| 28176     | 16          | V_AP_LW_VN_STAT         | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 9.766E-04, 0                                                   | S (note 1) |
| 28192     | 16          | V_AP_SMWIR_ADJ_BIAS_1V  | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 8.057E-04, 0                                                   | S (note 1) |
| 28208     | 16          | V_AP_SMWIR_ADJ_BIAS_2V  | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 8.082E-04, 0                                                   | S (note 1) |
| 28224     | 16          | V_AP_SM_VNRS1           | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 4.570E-04, 0                                                   | S (note 1) |
| 28240     | 16          | V_AF_SW_DGAIN_SW_VREF   | Adjusts the gain transition bias for M13 on the SMIVIR FPA                                    | V                          | 0, 0, 0, 0, 8.082E-04, 0                                                   | S (note 1) |
| 28256     | 16          | V_AP_SW_VR_CLAMP        | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0                                   | S (note 1) |
| 28272     | 16          | V_AP_SM_VI_CLAMP        | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28288     | 16          | V_AP_SM_VPO             | Digital number of the ASP bias                                                                | V V                        | 0, 0, 0, 0, 3.052E-04, 0                                                   | S (note 1) |
| 28304     | 16          | V_AF_SIVI_VINA          | Digital number of the ASP bias                                                                | V                          | 0, 0, 0, 0, 7.641E-04, 0                                                   | S (note 1) |
| 28320     | 16          |                         | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 7.641E-04, 0                                                   | S (note 1) |
| 28330     | 10          |                         | Digital number of the ASP blas                                                                | V                          | 0, 0, 0, 9, 766E-04, 0                                                     | S (note 1) |
| 28352     | 16          | V_AP_VISNIR_ADJ_BIAS_1V | Digital number of the ASP bias                                                                | v                          | U, U, U, U, 8.057E-04, U                                                   | S (note 1) |
| 20300     | 10          |                         | Digital number of the ASP bias                                                                | v<br>V                     | 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0                                   | S (note 1) |
| 28400     | 16          |                         | Digital number of the ASP bias                                                                | , v                        | 0, 0, 0, 0, 1002-00, 0                                                     | S (note 1) |
| 28/16     | 16          | V AP VN VR CLAMP        | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 3.0520E-04, 0                                                  | S (note 1) |
| 28432     | 16          |                         | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 3, 0520E-04, 0                                                 | S (note 1) |
| 20432     | 16          | V AP VN VPO             | Digital number of the ASP bias                                                                | v                          |                                                                            | S (note 1) |
| 28464     | 16          |                         | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0                                   | S (note 1) |
| 28480     | 16          |                         | Digital number of the ASP bias                                                                | ý.                         | 0, 0, 0, 0, 7, 641E-04, 0                                                  | S (note 1) |
| 28496     | 16          | V AP VN VN STAT         | Digital number of the ASP bias                                                                | v                          | 0, 0, 0, 0, 9, 766E-04, 0                                                  | S (note 1) |
| 28512     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28516     | 12          | EC AP LW SELFTEST VB    | FSW echo of Vbase value in part of cmd C AP10 LWIR FPA Self Test                              | V                          | 0 to 4095 0 0 0 1 3180E-03 -5 1950E+00                                     | 10/5       |
| 28528     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28532     | 12          | EC AP LW SELFTEST VS CM | FSW echo of Vstep value in part of cmd C AP16 VIS/NIR FPA Self Self Test                      | V                          | 0 to 4095; 0, 0, 0, 0, 1, 3219E-03, -5, 2100E+00                           | 100 C      |
| 28544     | 16          | EV_AP_LW_SELFTEST_VS_TL | HW timy of Vstep.                                                                             | V                          | 0, 0, 0, 0, 8,057E-04, 0                                                   | S (note 1) |
| 28560     | 16          | EV_AP_LW_VAB_ADJ        | LWIR FPA ADJ Bias 1                                                                           | V                          | 0, 0, 0, 0, 8.057E-04, 0                                                   | S (note 1) |
| 28576     | 16          | EV_AP_LW_VDET_ADJ       | LWIR FPA ADJ Bias 2                                                                           | V                          | 0, 0, 0, 0, 8.057E-04, 0                                                   | S (note 1) |
| 28592     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28596     | 12          | EC_AP_SM_SELFTEST_VB    | FSW echo of Vbase value in part of cmd C_AP13 SMIR FPA Self Test                              | V                          | 0 to 4095: 0, 0, 0, 0, 1.3310E-03, -5.2000E+00                             | U          |
| 28608     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28612     | 12          | EC_AP_SM_SELFTEST_VS_CM | FSW echo of Vstep value in part cmd C_AP13 SMIR FPA Self Test                                 | V                          | 0 to 4095: 0, 0, 0, 0, 1.3326E-03, -5.2050E+00                             | U          |
| 28624     | 16          | EV_AP_SM_SELFTEST_VS_TL | HW timy of Vstep.                                                                             | V                          | 0 to 4095: 0, 0, 0, 0, 1.3326E-03, -5.2050E+00                             | S (note 1) |
| 28640     | 16          | EV_AP_SM_VAB_ADJ        | S/MWIR FPA VADJ Bias 1                                                                        | V                          | -8192 to 8191: 0, 0, 0, 0, 8.057E-04, 0                                    | S (note 1) |
| 28656     | 16          | EV_AP_SM_DGAIN_SW_VREF  | Digital value for ASP bias controlling high to low gain switch point for SMWIR dual gain band |                            | -8192 to 8191: 0, 0, 0, 0, 8.082E-04, 0                                    | S (note 1) |
| 28672     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28676     | 12          | EC_AP_VN_SELFTEST_VB    | FSW echo of Vbase value in part of cmd C_AP16 VIS/NIR FPA STest                               | V                          | 0 to 4095: 0, 0, 0, 0, 1.3415E-03, -5.2050E+00                             | U          |
| 28688     | 4           | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
| 28692     | 12          | EC_AP_VN_SELFTEST_VS_CM | FSW echo of Vstep value in part of cmd C_AP16 VIS/NIR FPA Self Self Test                      | V                          | 0 to 4095: 0, 0, 0, 0, 1.3415E-03, -5.2050E+00                             | U          |
| 28704     | 16          | EV_AP_VN_SELFTEST_VS_TL | HW timy of Vstep.                                                                             | V                          | -8192 to 8191: 0, 0, 0, 0, 8.057E-04, 0                                    | S (note 1) |
| 28720     | 16          | EV_AP_VN_VAB_ADJ        | VIS/NIR FPA VADJ Bias 1                                                                       | V                          | -8192 to 8191: 0, 0, 0, 0, 8.057E-04, 0                                    | S          |
| 28736     | 304         | Byte Fill or Spare Bits | N/A                                                                                           | N/A                        | N/A                                                                        | N/A        |
|           |             |                         |                                                                                               |                            |                                                                            |            |
|           |             |                         |                                                                                               |                            |                                                                            |            |

| Table 4.4.15 | VIIRS Engineering Packet User Data Fields (cont) |
|--------------|--------------------------------------------------|
|              |                                                  |

| Start Bit | Bit<br>Size | Memonic Name            | Description                                                                              | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                   | Data Type   |
|-----------|-------------|-------------------------|------------------------------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------|-------------|
| 29040     | 16          | ETP_BB_1                | Blackbody Prec Thermistor 1.                                                             | к                          | 0, 0, 1.73184E-07, -1.01791E-06, 2.64901E-04, 1.06386E-03                                    | S (note 1)  |
| 29056     | 16          | ETP_BB_2                | Black Body Prec Therm 2 (2&5 mid pair; used in Radiometry Model.)                        | к                          | 0, 0, 1.77547E-07, -1.19299E-06, 2.66401E-04, 1.05888E-03                                    | S (note 1)  |
| 29072     | 16          | ETP_BB_3                | Blackbody thermistor 3.                                                                  | К                          | 0, 0, 1.84935E-07, -1.34424E-06, 2.67788E-04, 1.05663E-03                                    | S (note 1)  |
| 29088     | 16          | ETP BB 4                | Blackbody thermistor 4.                                                                  | к                          | 0. 0. 1.76704E-07 -1.14556E-06. 2.66139E-04. 1.05893E-03                                     | S (note 1)  |
| 29104     | 16          | ETP BB 5                | Black Body Prec Therm 2 (2&5 mid pair; used in Radiometry Model.)                        | к                          | 0. 0. 1.77453E-07 -1.16723E-06.2.65736E-04.1.06355E-03                                       | S (note 1)  |
| 29120     | 16          | ETP BB 6                | Blackbody thermistor 6                                                                   | к                          | 0 0 1 82362E-07 -1 25807E-06 2 66875E-04 1 05718E-03                                         | S (note 1)  |
| 29136     | 16          | ETP SE HAM MIRE T1      | Half Angle Mirror T2 Prec Therm 07. Radiatively coupled (Used in Radiometry Model)       | С                          | 1 73677E-19 -1 35549E-15 1 04291E-11 4 76732E-09 4 48094E-03 1 46923E+01                     | S (note 1)  |
| 29152     | 16          | ETP SE HAM MIRE T2      | Half Angle Mirror T2 Prec Therm 08, Radiatively coupled (Used in Radiometry Model)       | С                          | 1 73677E-19 -1 35549E-15 1 04291E-11 4 76732E-09 4 48094E-03 1 46923E+01                     | S (note 1)  |
| 29168     | 16          | ETA HM CR CS PRT        | CR Cold Stage PRT Temperature: OG Htr runs open loop with 103V, but OT shutdown=315K     | č                          | 1 82981E-21 7 12887E-17 6 49295E-17 4 25187E-07 1 94964E-02 -8 78409E+01                     | S (note 1)  |
| 29184     | 16          | ETA HM CR IS PRT        | CR Intermediate Stage PRT Temp: OG Htr runs open loop with 103V, but OT shutdown=315K    | C                          | 1 89058E-21 7 36533E-17 6 63583E-12 4 31439E-07 1 96481E-02 -8 71583E+01                     | S (note 1)  |
| 20101     |             |                         | CR Outer Stage PRT Temperature. Note - OS OG Htr is not used on Orbit. Powered by PS via | -                          |                                                                                              | O (note 1)  |
| 29200     | 16          | ETA HM CR OS PRT        | Svs Test Connector in Gnd Test.                                                          | С                          | -8192 to 8191 1 72808E-21 5 49833E-17 5 89968E-12 3 87506E-07 1 80348E-02 -1 16480E+02       | S (note 1)  |
| 29216     | 4           | Byte Fill or Spare Bits | ,<br>N/A                                                                                 | N/A                        | N/A                                                                                          | N/A         |
| 29220     | 12          | EC AP VN VREE INHIBIT   | ESW echo of VREE value in part of cmd C_AP24 C_AP_VN_VREE_INHIBIT                        | V                          | 0 0 0 0 1 3345-03 -5 1950                                                                    | 6           |
| 29232     | 32          | Byte Fill or Spare Bits |                                                                                          | N/A                        |                                                                                              | N/A         |
| LOLOL     | 02          | Byter in or optice Bits |                                                                                          |                            | -8192 to -6960: 9.979627E-14_3.731914E-9_5.581287E-5_0.4172688_1559.433_2330597              | N/A         |
|           |             |                         |                                                                                          |                            | -6959 to 6407 6 485253E-19 7 472779E-16 1 570061E-11 6 797785E-8 0 005848781 23 27404        | S (noto 1)  |
| 29264     | 16          | ETP HM HAM DB OP HTR A  | HAM DB BEARING OP HTR A Therm 17: OT shutdown=-3°C                                       | C S                        | 6408 to 8191 1 398806E-15 -4 797223E-11 6 598466E-7 -0 004544669 15 67418 -21599 49          | S (note 1)  |
| 20204     | 10          |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14_3.731914E-9_5.581287E-5_0.4172688_1559.433_2330597              |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407 6 485253E-19 7 472779E-16 1 570061E-11 6 797785E-8 0 005848781 23 27404        | S (noto 1)  |
| 29280     | 16          | ETP HM HAM DB OP HTR B  | HAM DB BEARING OP HTR A Therm 21: OT shutdown=-3°C                                       | C C                        | 6408 to 8191 1 398806E-15 -4 797223E-11 6 598466E-7 -0 004544669 15 67418 -21599 49          | S (note 1)  |
| 20200     | 10          |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559,433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6 485253E-19, 7 472779E-16, 1 570061E-11, 6 797785E-8, 0 005848781, 23 27404  | S (note 1)  |
| 29296     | 16          | ETP HM TELE DB OP HTR A | TELE DB BEARING OP HTR A Therm 18: OT shutdown=-3°C                                      | С                          | 6408 to 8191: 1.398806E-154.797223E-11. 6.598466E-70.004544669. 15.6741821599.49             | O (note 1)  |
| 20200     |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559,433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6 485253E-19, 7 472779E-16, 1 570061E-11, 6 797785E-8, 0 005848781, 23 27404  | S (note 1)  |
| 29312     | 16          | ETP HM TELE DB OP HTR B | TELE DB BEARING OP HTR B Therm 23: OT shutdown=-3°C                                      | С                          | 6408 to 8191: 1.398806E-154.797223E-11. 6.598466E-70.004544669. 15.6741821599.49             | O (note 1)  |
| 20012     |             |                         |                                                                                          | -                          | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559,433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407; 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23,27404  | S (note 1)  |
| 29328     | 16          | ETP MF AO BLKHD NX PZ   | ME AO BIKHD NX PZ Therm 45                                                               | С                          | 6408 to 8191; 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    | 0 (11010 1) |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29344     | 16          | ETP MF AO BLKHD PX NZ   | MF AO BLKHD PX NZ Therm 44                                                               | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    | 0 (11010 1) |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29360     | 16          | ETP_MF_AO_KM2_NX        | Aft Optics KM2_NX, Type KM2 has 2 deg of constraint. Therm 38                            | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    | - (         |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29376     | 16          | ETP_MF_AO_KM2_NY        | Aft Optics KM2_NY, Type KM2 has 2 deg of constraint. Therm 39 ("System" Indicator)       | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    | ,           |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29392     | 16          | ETP_MF_AO_KM3_PX        | Aft Optics KM3_PX. Type KM3 has 3 deg of constraint. Therm 40                            | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    | , ,         |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29408     | 16          | ETP_MF_FOLD_MIR_BKHD_CT | MF_FOLD MIRROR BLKHD Center Therm 6                                                      | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    |             |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29424     | 16          | ETP_MF_HAM_BLKHD        | MF HAM Bulkhead Therm 43                                                                 | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    |             |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29440     | 16          | ETP_MF_KM1_NXNY         | Mainframe NXNY Kinematic Mount Therm 35; Type KM2 has 1 deg of constraint.               | С                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    |             |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         |                                                                                          |                            | -6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404  | S (note 1)  |
| 29456     | 16          | ETP_MF_KM2_NXPY         | Maintrame NXPY Kinematic Mount Therm 34; Type KM2 has 2 deg of constraint.               | C                          | 6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49    |             |
|           |             |                         |                                                                                          |                            | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597         |             |
|           |             |                         | Mainforme DVNN/ Kinematic Manual Therm 20: Ture (KH0 has did                             |                            | -0909 to 0407: 0.480253E-19, 7.472779E-16, 1.57006E-11, 6.797785E-8, 0.005848781, 23.27404   | S (note 1)  |
| 29472     | 16          | ETP_MF_KM1_PXNY         | waininame PANY Kinematic Mount Therm 36; Type KM2 has 1 deg of constraint.               | U U                        | 0400 tu o 1911 - 1.398800E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49 |             |
|           |             |                         |                                                                                          |                            |                                                                                              |             |

| Start Bit | Bit<br>Size | Mnemonic Name           | Description                                                                     | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                        | Data Type  |  |
|-----------|-------------|-------------------------|---------------------------------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|
| 29488     | 16          | ETP_MF_KM2_PXPY         | Mainframe PXPY Kinematic Mount Therm 37; Type KM2 has 2 deg of constraint.      | с                          | -8192 to -5960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848761, 23.27404<br>6408 to 8191: 1.388406E-15, -4.797223E-11, 6.598469E-7, -0.004544668, 15.67418, -21593.49  | S (note 1) |  |
| 29504     | 16          | ETP_MF_NADIR_RADITR_NXP | MF_NADIR_RADIATOR_NXPY Therm 15, RT15                                           | с                          | -8192 to -8960: 9.979627FE-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559 433, 233057<br>-6959 to 6407: 6.485253E-19, 742279E-16, 1.570061E-11, 6.797785E-8, 0.005484781, 23.27404<br>6408 to 8191: 1.398806E-15, 4.797223E-11, 6.598466E-7, -0.04544669, 15.67418, -21599.49      | S (note 1) |  |
| 29520     | 16          | ETP_MF_NADIR_RADITR_PXN | MF_NADIR_RADIATOR_PXNY Therm 5, RT8                                             | с                          | -8192 to -8960: 9.97692/tE=14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 6407: 6.482558E-19, 747279E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29536     | 16          | ETP_MF_SCAN_CAVITY_NX_N | MF_SCAN_CAVITY_NX_NZ Therm 47                                                   | с                          | -8192 to -8960; 99/9627E-14, 3/31914E-9, 5.581287E-5, 0.4172688, 1559 432, 2330597<br>-6595 to 6407; 6.485255E-19, 7.47279E-16, 1570051E-11, 6.797785E-8, 0.005648781, 23.27404<br>-6408 to.8191; 1.398806E-15, 4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49      | S (note 1) |  |
| 29552     | 16          | ETP_MF_SCAN_CAVITY_NX_P | MF_SCAN_CAVITY_NX_PZ Therm 46; (Node 1042 in Radiometry Model;cavity indicator) | с                          | -5192 to 5060; 99/962/E-14, 3/31914E-9, 5561287E-5, 0/41/2668, 1559433, 233097<br>6595 to 6407; 6.485255E-19, 747279E-16, 1570051E-11, 6.79785E-8, 0.005648781, 23.27404<br>6408 to 8191; 1.398806E-15, 4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49              | S (note 1) |  |
| 29568     | 16          | ETP_MF_SCAN_CVTY_BAF_NZ | Temp MF Scan Cavity Baffle NZ Prec Therm 10;(Node 1272 in Radiometry Model)     | с                          | 1.7332E-19, -1.35549E-15, 1.04291E-11, 4.76732E-09, 4.48094E-03, 1.46923E+01                                                                                                                                                                                                      | S (note 1) |  |
| 29584     | 16          | ETP_MF_SCAN_CVTY_BAF_PZ | Temp MF Scan Cavity Baffle NZ Prec Therm 9; (Node 1272 in Radiometry Model)     | c                          | 1.7332E-19, -1.35549E-15, 1.04291E-11, 4.76732E-09, 4.48094E-03, 1.46923E+01                                                                                                                                                                                                      | S (note 1) |  |
| 29600     | 16          | ETP_MF_SCAN_CVTY_BKHD_N | MF_SCAN_CAVITY_BLKHD_NY Therm 8                                                 | С                          | -5192 to -5960; 99/962/E-14, 3:/31914E-9, 5:61267E-5, 0:41/2668, 1559433, 23:0597<br>6595 to 6407: 6:485255E-19, 7:47279E-16, 1570051E-11, 6:79785E-8, 0:005848781, 23:27404<br>6408 to 8191: 1:398806E-15, 4:797223E-11, 6:598466E-7, -0:004544669, 15:67418, -21599.49          | S (note 1) |  |
| 29616     | 16          | ETP_MF_SPACE_RADIATOR_N | MF_SPACE_RADIATOR_NZ Therm 41                                                   | с                          | -8192 to -8960; 99/962/t=-14, 3/31914E-9, 5.86128/t=-5, 0.417/268, 1559 433, 233097<br>-6895 to 6407: 6.485258-19, 7.47279E-16, 1570051E-11, 6.97785E-8, 0.006548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49       | S (note 1) |  |
| 29632     | 16          | ETP_MF_SPACE_RADIATOR_P | MF_SPACE_RADIATOR_PZ Therm 42                                                   | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 432, 2330597<br>-6959 to 6407: 6.485258E-19, 7.47279E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29648     | 16          | ETP_MF_STOPASSY_BAFF_NZ | On Baffle NZ of Apert Stop Assy between HAM & FM2 Therm 14                      | с                          | -8192 to -8960: 9.97962/tr=14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.47279E-16, 1.570061E-11, 6.79785E-8, 0.006548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29664     | 16          | ETP_MF_TEL_BLKHD_NYPZ   | On Tel_Bikhd_NYPZ Therm 11                                                      | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 6407: 6.485258E-19, 7-47279E-16, 1.570051E-11, 6.797785E-8, 0.006548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29680     | 16          | ETP_MF_TEL_BLKHD_PY     | On Tel_Bikhd_PN Therm 11                                                        | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 432, 2330597<br>-6959 to 6407: 6.485253E-19, 7.47279E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29696     | 16          | ETP_SE_A_HAMMTR_DFBEAR  | HAM DF Bearing Temp MTR_A Therm 29,temp≡nominal -5°C when Op_Htr is on.         | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 432, 2330597<br>-6959 to 6407: 6.485253E-19, 7.47279E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29712     | 16          | ETP_SE_A_TELEMTR_DFBEAR | TELE DF Bearing Temp MTR_A Therm28,temp=nominal -5°C when Op_Htr is on.         | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 5407: 6.485253E-19, 7.47279E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |
| 29728     | 16          | ETP_SE_B_HAMMTR_DFBEAR  | HAM DF Bearing Temp MTR_B Therm 10,temp=nominal -5°C when Op_Htr is on.         | с                          | -8192 to -8960: 9.97962/tr=14, 3.731914E-9, 5.881287E-5, 0.4172688, 1559 433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.388400E-15, -4.797223E-11, 6.598460E-7, -0.004544669, 1567418, -21599.49  | S (note 1) |  |
| 29744     | 16          | ETP_SE_B_TELEMTR_DFBEAR | TELE DF Bearing Temp MTR_B Therm09,temp=nominal -5°C when Op_Htr is on.         | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172888, 1559 433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.388406E-15, -4.797223E-11, 6.598466E-7, -0.00544669, 1567418, -21599.49    | S (note 1) |  |
| 29760     | 16          | ETP_AP_LW_CCA           | Primary LWIR CCA Thermistor 01                                                  | с                          | -8192 to -5960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559 432, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005848761, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 1.5 67418, -21599.49 | S (note 1) |  |
|           | HBAIL CE    |                         |                                                                                 |                            |                                                                                                                                                                                                                                                                                   |            |  |

| Table 4.4.15 VIIRS Engineering Packet User Data Fields (co | nt) |
|------------------------------------------------------------|-----|
|------------------------------------------------------------|-----|

| Start Bit | Bit<br>Size | Mnemonic Name           | Description                                           | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                       | Data Type  |  |  |
|-----------|-------------|-------------------------|-------------------------------------------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|--|--|
| 29776     | 16          | ETP_AP_SM_CCA           | S/MWIR CCA Thermistor 02                              | с                          | -8192 to -6960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.57061E-11, 6.797785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, 4.797223E-11, 6.598466E-7, 0.004544669, 15.67418, -21599.49    | S (note 1) |  |  |
| 29792     | 16          | ETP_AP_VN_CCA           | VIS/NIR CCA Thermistor 03                             | с                          | -8192 to -8960: 9.976627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.432, 2330597<br>-6959 to 6407: 6.485253E-19, 747279E-16, 1.570061E-11, 6.79785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, 4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49     | S (note 1) |  |  |
| 29808     | 16          | ETP_DP_DNB_CCA          | DNB CCA Thermistor 60                                 | с                          | -8192 to -8960: 9,976627E=14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6959 to 6407: 6.4485258E-19, 747279E-16, 1.570061E-11, 6.79785E-8, 0.005848781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |  |
| 29824     | 16          | ETP_DP_DPP_CCA          | DPP CCA Thermistor 61                                 | с                          | -8192 to -8960: 9,979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6959 to 6407: 6.4485255E-19, 7.47279E-16, 1.57061E-11, 6.797785E-8, 0.005484781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49  | S (note 1) |  |  |
| 29840     | 16          | ETP_DP_FPIE_AD_CCA      | FPIE A/D CCA Thermistor 13                            | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6995 to 6407: 6.485258E-19, 7.47279E-16, 1.570061E-11, 6.79785E-8, 0.005848781, 23.27404<br>-6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49  | S (note 1) |  |  |
| 29856     | 16          | ETP_DP_FPIE_CLK_CCA     | FPIE CLK CCA Thermistor 51                            | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-8959 to 6407: 6.4485258E-19, 747279E-16, 1570061E-11, 6.79785E-8, 0.005848781, 23.27404<br>-6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49   | S (note 1) |  |  |
| 29872     | 16          | ETP_FT_CCA              | FT CCA Thermistor 07                                  | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.81287E-5, 0.4172688, 1559.433, 2330597<br>-6995 to 6407: 6.4485258E-19, 747279E-16, 1570061E-11, 6.79785E-8, 0.008548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49     | S (note 1) |  |  |
| 29888     | 16          | ETP_PS1                 | Power Supply 1 Thermistor 52                          | С                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.81287E-5, 0.4172688, 1559.433, 2330597<br>-6995 to 6407: 6.4485258E-19, 747279E-16, 1570061E-11, 6.79785E-8, 0.008548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49     | S (note 1) |  |  |
| 29904     | 16          | ETP_PS2                 | Power Supply 2 Thermistor 53                          | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.81287E-5, 0.4172688, 1559.433, 2330597<br>-6995 to 6407: 6.4485258E-19, 747279E-16, 1570061E-11, 6.79785E-8, 0.008548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49     | S (note 1) |  |  |
| 29920     | 16          | ETP_SE_A_CCA            | SCE_A CCA Thermistor 31                               | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6995 to 6407: 6.4485258E-19, 7.47279E-16, 1.570061E-11, 6.79785E-8, 0.008548781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49  | S (note 1) |  |  |
| 29936     | 16          | ETP_SE_B_CCA            | SCE_B CCA Thermistor 12                               | с                          | -8192 to -8960: 9.979627E-14, 3.731914E-9, 5.581287E-5, 0.4172688, 1559.433, 2330597<br>-6959 to 6407: 6.485253E-19, 7.472779E-16, 1.570061E-11, 6.797785E-8, 0.005648781, 23.27404<br>6408 to 8191: 1.398806E-15, -4.797223E-11, 6.598466E-7, -0.004544669, 15.67418, -21599.49 | S (note 1) |  |  |
| 29952     | 1           | EC_FT_LW_78K_SETPT      | LWIR 78K SetPoint (If both 78K&80K=0, then setpt=76K) | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | в          |  |  |
| 29953     | 1           | EC_FT_LW_80K_SETPT      | LWIR 80K SetPoint (If both 78K&80K=0, then setpt=76K) | 0<br>1                     | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29954     | 1           | EC_FT_SM_78K_SETPT      | SMIR 78K SetPoint (If both 78K&80K=0, then setpt=76K) | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29955     | 1           | EC_FT_SM_80K_SETPT      | SMIR 80K SetPoint (If both 78K&80K=0, then setpt=76K) | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29956     | 1           | EC_FT_LW_HTR_ON         | LWIR Heater Status                                    | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29957     | 1           | EC_FT_SM_HTR_ON         | SMIR Heater Status                                    | 0<br>1                     | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29958     | 1           | EC_HM_DNB_HTR_CNTL      | FSW echo C_HM06a for DNB Heater Status                | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29959     | 1           | EC_HM_HAM_OP_HTR_CNTL   | FSW echo C_HM09 for HAM Heater Status                 | 0                          | OFF<br>ON                                                                                                                                                                                                                                                                        | В          |  |  |
| 29960     | 7           | Byte Fill or Spare Bits | N/A                                                   | N/A                        | N/A<br>OFF                                                                                                                                                                                                                                                                       | N/A        |  |  |
| 29967     | 1           | EC_HM_TEL_OP_HTR_CNTL   | FSW echo C_HM10 for Tele Op Heater Status             | 1                          | ON ON                                                                                                                                                                                                                                                                            | В          |  |  |
|           | DB/III CII  |                         |                                                       |                            |                                                                                                                                                                                                                                                                                  |            |  |  |

| Start Bit | Bit<br>Size | Mnemonic Name            | Description                                                                          | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name           | Data Type  |
|-----------|-------------|--------------------------|--------------------------------------------------------------------------------------|----------------------------|--------------------------------------------------------------------------------------|------------|
| 29968     | 2           | Byte Fill or Spare Bits  | N/A                                                                                  | N/A                        | N/A                                                                                  | N/A        |
| 29970     | 14          | EC_HM_HAM_OPHTR_TEMP_SE  | Indicates Htr setpoint as FSW echo of Cmd C_HM09                                     | с                          | 5.90381E-19, -2.348307E-14, 3.918352E-10, -3.352887E-06, 2.022749E-02, -4.895340E+01 | U          |
| 29984     | 2           | Byte Fill or Spare Bits  | N/A                                                                                  | N/A                        | N/A                                                                                  | N/A        |
| 29986     | 14          | EC_HM_TEL_OPHTR_TEMP_SET | Indicates Htr setpoint as FSW echo of Cmd C_HM10                                     | с                          | 5.90381E-19, -2.348307E-14, 3.918352E-10, -3.352887E-06, 2.022749E-02, -4.895340E+01 | U          |
| 30000     | 2           | Byte Fill or Spare Bits  | N/A                                                                                  | N/A                        | N/A                                                                                  | N/A        |
| 30002     | 14          | ETP_BB_AVG_TEMP          | Average of the blackbody thermistor temperatures.                                    | N/A                        | 1.678529E-19, -7.872473E-15, 1.553232E-10, -1.579565E-06, 1.262724E-02, 2.345045E+02 | U          |
| 30016     | 2           | Byte Fill or Spare Bits  | N/A                                                                                  | N/A                        | N/A                                                                                  | N/A        |
| 30018     | 14          | EC_BB_HTR_TEMP_SET       | FSW echo, see Cmd C_BB01 description, which is T Kelvin                              | к                          | N/A                                                                                  | U          |
| 30032     | 16          | EC_BB_SELECT             | Indicates which blackbody thermistors are being used to get the average temperature. | N/A                        | N/A                                                                                  | U          |
| 30048     | 16          | Byte Fill or Spare Bits  | N/A                                                                                  | N/A                        | N/A                                                                                  | N/A        |
| 30064     | 8           | S_SD_POSITION            | SDSM position.                                                                       | N/A                        | N/A                                                                                  | U          |
| 30072     | 16          | V_SD_SDSM_AMP1_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30088     | 16          | V_SD_SDSM_AMP2_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30104     | 16          | V_SD_SDSM_AMP3_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30120     | 16          | V_SD_SDSM_AMP4_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30136     | 16          | V_SD_SDSM_AMP5_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30152     | 16          | V_SD_SDSM_AMP6_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30168     | 16          | V_SD_SDSM_AMP7_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30184     | 16          | V_SD_SDSM_AMP8_SMPL1     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30200     | 16          | V_SD_SDSM_AMP1_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30216     | 16          | V_SD_SDSM_AMP2_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30232     | 16          | V_SD_SDSM_AMP3_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30248     | 16          | V_SD_SDSM_AMP4_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30264     | 16          | V_SD_SDSM_AMP5_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30280     | 16          | V_SD_SDSM_AMP6_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30296     | 16          | V_SD_SDSM_AMP7_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30312     | 16          | V_SD_SDSM_AMP8_SMPL2     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30328     | 16          | V_SD_SDSM_AMP1_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30344     | 16          | V_SD_SDSM_AMP2_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30360     | 16          | V_SD_SDSM_AMP3_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30376     | 16          | V_SD_SDSM_AMP4_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30392     | 16          | V_SD_SDSM_AMP5_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30408     | 16          | V_SD_SDSM_AMP6_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30424     | 16          | V_SD_SDSM_AMP7_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30440     | 16          | V_SD_SDSM_AMP8_SMPL3     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30456     | 16          | V_SD_SDSM_AMP1_SMPL4     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30472     | 16          | V_SD_SDSM_AMP2_SMPL4     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052,0                                                                 | S (note 1) |
| 30488     | 16          | V_SD_SDSM_AMP3_SMPL4     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30504     | 16          | V_SD_SDSM_AMP4_SMPL4     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |
| 30520     | 16          | V_SD_SDSM_AMP5_SMPL4     | SDSM sample data.                                                                    | V                          | -, -, -, 0.0003052, 0                                                                | S (note 1) |

### Table 4.4.15 VIIRS Engineering Packet User Data Fields (cont)

SDOW sample of SDOW s

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| Table 4.4.15 | VIIRS Engineering                     | a Packet User | <sup>.</sup> Data Fields ( | (cont)  |
|--------------|---------------------------------------|---------------|----------------------------|---------|
|              | · · · · · · · · · · · · · · · · · · · |               |                            | (00110) |

| Start Bit | Bit  | Mnemonic Name             | Description                                                                                   | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                  | Data Type  |  |  |
|-----------|------|---------------------------|-----------------------------------------------------------------------------------------------|-------------|---------------------------------------------------------------------------------------------------------|------------|--|--|
|           | Size |                           |                                                                                               | State Value | State Name                                                                                              |            |  |  |
| 30536     | 16   | V_SD_SDSM_AMP6_SMPL4      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30552     | 16   | V_SD_SDSM_AMP7_SMPL4      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30568     | 16   | V_SD_SDSM_AMP8_SMPL4      | SDSM sample data.                                                                             | V           |                                                                                                         | S (note 1) |  |  |
| 30584     | 16   | V_SD_SDSM_AMP1_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30600     | 16   | V_SD_SDSM_AMP2_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30616     | 16   | V_SD_SDSM_AMP3_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30632     | 16   | V_SD_SDSM_AMP4_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30648     | 16   | V_SD_SDSM_AMP5_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052, 0                                                                                   | S (note 1) |  |  |
| 30664     | 16   | V_SD_SDSW_AMP5_SMPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052,0                                                                                    | S (note 1) |  |  |
| 30680     | 16   | V_SD_SDSW_AMP?_SWPL5      | SDSM sample data.                                                                             | V           | -, -, -, 0.0003052,0                                                                                    | S (note 1) |  |  |
| 30696     | 10   | V_3D_3D3MI_AMF8_3MFL3     | SDSM sample data.                                                                             | v           | -, -, -, 0.0003052,0<br>_8192 to -6960: 9 979627E-14 3 731914E-9 5 581287E-5 0 4172688 1559 433 2330597 | S (note 1) |  |  |
|           |      |                           |                                                                                               |             | -6959 to 6407: 6 485253E-19 7 472779E-16 1 570061E-11 6 797785E-8 0 005848781 23 27404                  | S (noto 1) |  |  |
| 30712     | 16   | ETP SD SDSM PREAMP        | SDSM Preamp Thermistor 57                                                                     | С           | 6408 to 8191: 1.398806E-154.797223E-11.6.598466E-70.004544669.15.6741821599.49                          | S (note 1) |  |  |
| 30728     | 4    | Byte Fill or Spare Bits   | N/A                                                                                           | N/A         | N/A                                                                                                     | N/A        |  |  |
| 00120     |      |                           |                                                                                               | 0           | OFF                                                                                                     | 19/7       |  |  |
| 30732     | 1    | EC SD SDSM MTR HOLD       | Indicates SDSM motor hold is ON or OFF                                                        | 1           | ON                                                                                                      | В          |  |  |
|           |      |                           |                                                                                               | 0           | PS1                                                                                                     | _          |  |  |
| 30733     | 1    | EC_SD_PREAMP_EVEN_PWR     | SDSM Preamp 2,4,6,8 Power                                                                     | 1           | PS2                                                                                                     | в          |  |  |
|           |      |                           |                                                                                               | 0           | PS1                                                                                                     |            |  |  |
| 30734     | 1    | EC_SD_PREAMP_ODD_PWR      | SDSM Preamp 1,3,5,7 Power                                                                     | 1           | PS2                                                                                                     | В          |  |  |
|           |      |                           | SDSM Motor Home                                                                               |             |                                                                                                         |            |  |  |
|           |      |                           | When SDSM performs calibration cycle, this telemetry will be one scan delayed compared to the | 0           | NOT HOME                                                                                                |            |  |  |
| 30735     | 1    | EC_SD_SDSM_MTR_AT_HOME    | housekeeping packet motor home telemetry (LRV 11,003). SDSM detector output in LRVs 11,101-   | 1           | HOME                                                                                                    | В          |  |  |
|           |      |                           | 11,140 is synchronized only with the engineering packet SDSM position telemetry (LRVs 31,003  |             | TIONIE                                                                                                  |            |  |  |
|           |      |                           | and 31,004).                                                                                  |             |                                                                                                         |            |  |  |
| 30736     | 1376 | Byte Fill or Spare Bits   | N/A                                                                                           | N/A         | N/A                                                                                                     | N/A        |  |  |
| 32112 -   |      | S_SE_TELE_TIMESTMP_0000 - |                                                                                               |             |                                                                                                         | U          |  |  |
| 52736     | 16   | S_SE_TELE_TIMESTMP_1289   | Pulse arrival times from scan start. LSB = $0.4957 \mu$ sec.                                  | N/A         | N/A                                                                                                     |            |  |  |
| 52/52 -   | 40   | S_SE_HAM_TIMESTMP_0000 -  | Bulae arrival times from each start, LSB = 0.4057 (uses                                       | NVA         | N/A                                                                                                     | U          |  |  |
| 73370     | 10   | S_SE_HAM_TIMESTMF_1289    | Contains the telescope raw angle count at start of Earth                                      | N/A         | N/A                                                                                                     |            |  |  |
| 73392     | 10   | S_DP_TELE_ANG_SCAN_STRT   | Contains the HAM raw angle count at start of Earth                                            | N/A         | N/A<br>N/A                                                                                              | 0          |  |  |
| 73408     | 10   | S_DP_HAM_ANG_SCAN_STRT    | Value 1 of Hi-Bate Dwell Timy point                                                           | N/A<br>N/A  | N/A<br>N/A                                                                                              | U          |  |  |
| 73440     | 10   | ES_CP_HRDT_VALUE 2        | Value 2 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     |            |  |  |
| 73456     | 16   | ES_CP_HRDT_VALUE_3        | Value_2 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     | 3          |  |  |
| 73472     | 16   | ES CP HRDT_VALUE 4        | Value 4 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     | 5          |  |  |
| 73488     | 16   | ES CP HRDT VALUE 5        | Value 5 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     | 5          |  |  |
| 73504     | 16   | ES CP HRDT VALUE 6        | Value 6 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     | s          |  |  |
| 73520     | 16   | ES CP HRDT VALUE 7        | Value 7 of Hi-Rate Dwell Tlmy point                                                           | N/A         | NA                                                                                                      | s          |  |  |
| 73536     | 16   | ES CP HRDT VALUE 8        | Value 8 of Hi-Rate Dwell Timy point                                                           | N/A         | N/A                                                                                                     | s          |  |  |
| 73552     | 16   | ES CP HRDT VALUE 9        | Value 9 of Hi-Rate Dwell Tlmy point                                                           | N/A         | NA                                                                                                      | s          |  |  |
| 73568     | 16   | ES CP HRDT VALUE 10       | Value 10 of Hi-Rate Dwell Timy point                                                          | N/A         | N/A                                                                                                     | s          |  |  |
| 73584     | 16   | ES_CP_HRDT_VALUE_11       | Value_11 of Hi-Rate Dwell Timy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73600     | 16   | ES_CP_HRDT_VALUE_12       | Value_12 of Hi-Rate Dwell TImy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73616     | 16   | ES_CP_HRDT_VALUE_13       | Value_13 of Hi-Rate Dwell Timy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73632     | 16   | ES_CP_HRDT_VALUE_14       | Value_14 of Hi-Rate Dwell Timy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73648     | 16   | ES_CP_HRDT_VALUE_15       | Value_15 of Hi-Rate Dwell Timy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73664     | 16   | ES_CP_HRDT_VALUE_16       | Value_16 of Hi-Rate Dwell Tlmy point                                                          | N/A         | N/A                                                                                                     | S          |  |  |
| 73680     | 16   | C_CP_HRDT_MUXADDR         | Dwell telemetry.                                                                              | N/A         | N/A                                                                                                     | U          |  |  |
| 73696     | 4    | Byte Fill or Spare Bits   | N/A                                                                                           | N/A         | N/A                                                                                                     | N/A        |  |  |
| 73700     | 4    | Byte Fill or Spare Bits   | N/A                                                                                           | N/A         | N/A                                                                                                     | N/A        |  |  |
| 73704     | 712  | Byte Fill or Spare Bits   | N/A                                                                                           | N/A         | N/A                                                                                                     | N/A        |  |  |
| 74416     | 16   | S_CP_CHECKSUM             | Checksum of the engineering packet data field. Filled with zeros if not used.                 | N/A         | N/A                                                                                                     | U          |  |  |
|           |      |                           |                                                                                               |             |                                                                                                         |            |  |  |

### 4.4.7.4 Diagnostic Data

Diagnostic mode data differs from Operational mode data in the following major ways

- The APIDs associated with the bands in Diagnostic mode are 830 to 853, different from those in Operational mode.
- No aggregation is performed on the imaging and single gain band data. To highlight this fact, the contents of the Diagnostic mode science packets are called Samples (As opposed to Pixels in Operational Mode)
- Band subtraction, compression, and bow tie deletion are not performed.
- All 22 bands are packetized at all times there is no distinction between day and night.
- The extent of a scan is limited to +/- 13.16 degrees about Nadir. This lowers the
  overall output data rate, which in the absence of compression and aggregation,
  would otherwise be larger than in Operational Mode and larger than is
  acceptable at the system level.
- There is only one "aggregation sector" per packet. This sector contains all the data collected in the +/- 13.16 degrees scan by one detector.

Figure 4.4-27 summarizes the processing of data in Diagnostic Mode. Table 4.4.16 shows the processing functions implemented inside the "Arithmetic Processing" box in Figure 4.4-27. Note relation of the A, B & C points.



Figure 4.4-27 VIIRS Overview of Science Data Processing in Diagnostic Mode

| Band(s)               | A (14 bits)               | B (14 bits)            | C (15 bits)                  |
|-----------------------|---------------------------|------------------------|------------------------------|
| M16                   | M16 #1                    | M16 #2                 | C = (A + B) / 2 + (MSB=zero) |
| Dual gain (No Pred)   | 2 <sup>13</sup>           | Data + 2 <sup>13</sup> | C = B - A + (MSB = zero)     |
| Single gain (No Pred) | 2 <sup>13</sup> (14 bits) | Data + 2 <sup>13</sup> | C = B - A (MSB= zero)        |

 Table 4.4.16 VIIRS Arithmetic Processing Summary

Although no aggregation is performed in Diagnostic Mode, samples corresponding to one scan from one detector are treated as one "aggregation zone" for the purposes of packetization. Because bow tie deletion is not performed the number of samples from each detector in a band is the same. The number of samples per scan in Diagnostic Mode is less than in Operational Mode because the scan is limited to +/- 13.16 degrees. The overall process of data collection in Diagnostic Mode is shown in Figure 4.4-28 below.



Figure 4.4-28 VIIRS OVERVIEW OF DATA HANDLING IN DIAGNOSTIC MODE

Table 4.4.17 shows the number of samples in the "aggregation zone" by band type. All samples are 15 bits and are packed prior to be inserted into the packet.

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| Detectors    | Number of Samples in "Aggregation Zone"<br>* | Total Samples |
|--------------|----------------------------------------------|---------------|
| 0 through 15 | Moderate Resolution Bands (16 Bands)<br>1480 | 1480          |
| 0 through 31 | Imaging Bands (5 Bands)<br>2960              | 2960          |
| 0 through 15 | DNB (1 Band)<br>1376                         | 1376          |

## Table 4.4.17 VIIRS SUMMARY OF NUMBER OF SAMPLES IN AGGREGATION ZONE BY BAND TYPE

\* The use of the term "aggregation zone" is for consistency with previous section and with the nomenclature used to describe packet fields. No aggregation is actually performed.

### 4.4.7.4.1 Diagnostic Mode Arithmetic Processing

The arithmetic processing shown in Figure 4.4-27 is simpler than in Operational Mode because no band differencing or prediction is performed. This is reflected in the left hand side of Figure 4.4-27 by the addition of a constant 2<sup>13</sup>, as opposed to the differencing operation shown earlier in Figure 4.4-6. The details of the processing in Diagnostic Mode are otherwise the same as described earlier in Operational Mode Arithmetic Operations and are not be repeated here.

### 4.4.7.4.2 Diagnostic Mode Packet Processing

As in Operational Mode, there is one grouped CCSDS science packet per band. Each science data grouped packet consists of a First CCSDS Packet, N-1 Middle CCSDS Packets, and a Last CCSDS Packet, where N is the number of detectors associated with the band. The Middle and Last science data CCSDS packets consist of a Packet Primary Header followed by a User Data Field. Unlike Operational Mode, in Diagnostic Mode the User Data Field contains only 1 subfield of data. This subfield contains the uncompressed samples from a detector resulting from the reduced scan. Although this data subfield is denoted as "Aggr N" on the packet diagrams, N is always equal to 1.

To build the subfield the instrument packs the 15 bit samples. As in Operational Mode, 1 to 31 bits having value 0 are appended to the resulting data to make the total length of the "Aggr 1" subfield a multiple of 32 bits. The number of bits appended is stored in the "Number of Fill Bits" subfield in the science data middle and last CCSDS packets. To correctly unpack and interpret the data in the subfield, the appended bits must first be removed.

Figure 4.4-29 shows the processing of the science data packets in Diagnostic Mode.

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### 4.4.7.4.3 Diagnostic Mode Day/Night Band Processing

The format of the DNB HRD packet when the instrument is in diagnostic mode is also very similar to the other bands. There is only one "aggregation zone" and the data is not compressed. In Diagnostic mode, the length of a scan is shortened to ensure that the instrument data rate is within specification. As a result, the number of samples in a scan of the DNB is 1376, as previously shown in Table 4.4.17. The format of the DNB data is shown schematically in Figure 4.4-30. When in diagnostic mode, the DNB only operates in Aggregation Mode 32 (See Table 4.4.18). This does not affect the process for extracting data from a packet however.

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| Sector<br>in CCSDS<br>Packet | Aggre-<br>gation<br>Mode | Scan Angle<br>relative to Nadir<br>(degrees) | Samples per<br>Detector<br>per scan | Sector<br>in CCSDS<br>Packet | Aggre-<br>gation<br>Mode | Scan Angle<br>relative to Nadir<br>(degrees) | Pixels per<br>Detector<br>per scan |
|------------------------------|--------------------------|----------------------------------------------|-------------------------------------|------------------------------|--------------------------|----------------------------------------------|------------------------------------|
| 1                            | 32                       | -55.4                                        | 80                                  | 4                            | 1                        | 0.0                                          | 184                                |
| 1                            | 31                       | -55.3                                        | 16                                  | 4                            | 2                        | 9.4                                          | 72                                 |
| 1                            | 30                       | -54.7                                        | 64                                  | 4                            | 3                        | 13.0                                         | 88                                 |
| 1                            | 29                       | -54.0                                        | 64                                  | 4                            | 4                        | 17.2                                         | 72                                 |
| 1                            | 28                       | -53.3                                        | 64                                  | 4                            | 5                        | 20.5                                         | 80                                 |
| 1                            | 27                       | -53.0                                        | 32                                  | 4                            | 6                        | 23.9                                         | 72                                 |
| 1                            | 26                       | -52.7                                        | 24                                  | 4                            | 7                        | 26.8                                         | 64                                 |
| 1                            | 25                       | -51.8                                        | 72                                  | 4                            | 8                        | 29.2                                         | 64                                 |
| 1                            | 24                       | -51.3                                        | 40                                  | 4                            | 9                        | 31.5                                         | 64                                 |
| 1                            | 23                       | -50.5                                        | 56                                  | Tota                         | I Samples                | in Sector 4                                  | 760                                |
| 1                            | 22                       | -49.9                                        | 40                                  | 5                            | 10                       | 33.6                                         | 64                                 |
| 1                            | 21                       | -49.1                                        | 48                                  | 5                            | 11                       | 35.6                                         | 64                                 |
| 1                            | 20                       | -48.6                                        | 32                                  | 5                            | 12                       | 37.4                                         | 80                                 |
| 1                            | 19                       | -47.8                                        | 48                                  | 5                            | 13                       | 39.6                                         | 56                                 |
| 1                            | 18                       | -47.2                                        | 32                                  | 5                            | 14                       | 41.0                                         | 80                                 |
| 1                            | 17                       | -45.9                                        | 72                                  | 5                            | 15                       | 42.9                                         | 72                                 |
| Tot                          | al Samples               | in Sector 1                                  | 784                                 | 5                            | 16                       | 44.5                                         | 72                                 |
| 2                            | 16                       | -44.5                                        | 72                                  | Tota                         | I Samples                | in Sector 5                                  | 488                                |

Table 4.4.18 VIIRS DNB Reference Information

| Sector<br>in CCSDS<br>Packet | Aggre-<br>gation<br>Mode | Scan Angle<br>relative to Nadir<br>(degrees) | Samples per<br>Detector<br>per scan | Sector<br>in CCSDS<br>Packet | Aggre-<br>gation<br>Mode | Scan Angle<br>relative to Nadir<br>(degrees) | Pixels per<br>Detector<br>per scan |
|------------------------------|--------------------------|----------------------------------------------|-------------------------------------|------------------------------|--------------------------|----------------------------------------------|------------------------------------|
| 2                            | 15                       | -42.9                                        | 72                                  | 6                            | 17                       | 45.9                                         | 72                                 |
| 2                            | 14                       | -41.0                                        | 80                                  | 6                            | 18                       | 47.2                                         | 32                                 |
| 2                            | 13                       | -39.6                                        | 56                                  | 6                            | 19                       | 47.8                                         | 48                                 |
| 2                            | 12                       | -37.4                                        | 80                                  | 6                            | 20                       | 48.6                                         | 32                                 |
| 2                            | 11                       | -35.6                                        | 64                                  | 6                            | 21                       | 49.1                                         | 48                                 |
| 2                            | 10                       | -33.6                                        | 64                                  | 6                            | 22                       | 49.9                                         | 40                                 |
| Tot                          | al Samples               | in Sector 2                                  | 488                                 | 6                            | 23                       | 50.5                                         | 56                                 |
| 3                            | 9                        | -31.5                                        | 64                                  | 6                            | 24                       | 51.3                                         | 40                                 |
| 3                            | 8                        | -29.2                                        | 64                                  | 6                            | 25                       | 51.8                                         | 72                                 |
| 3                            | 7                        | -26.8                                        | 64                                  | 6                            | 26                       | 52.7                                         | 24                                 |
| 3                            | 6                        | -23.9                                        | 72                                  | 6                            | 27                       | 53.0                                         | 32                                 |
| 3                            | 5                        | -20.5                                        | 80                                  | 6                            | 28                       | 53.3                                         | 64                                 |
| 3                            | 4                        | -17.2                                        | 72                                  | 6                            | 29                       | 54.0                                         | 64                                 |
| 3                            | 3                        | -13.0                                        | 88                                  | 6                            | 30                       | 54.7                                         | 64                                 |
| 3                            | 2                        | -9.4                                         | 72                                  | 6                            | 31                       | 55.3                                         | 16                                 |
| 3                            | 1                        | 0.0                                          | 184                                 | 6                            | 32                       | 55.4                                         | 80                                 |
| Tot                          | al Samples               | in Sector 3                                  | 760                                 | Tota                         | al Samples               | in Sector 6                                  | 784                                |

Figure 4.4-31 shows, at a top level, the processing for DNB data when the instrument is in Diagnostic Mode. Note that although the above discussion treats the number of samples per scan in Diagnostic Mode as a constant, the number of samples is stored in the packet. Thus, if a command changes the scan length, the correct number of samples can be determined from this variable.

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Figure 4.4-31 VIIRS DNB PROCESSING FLOW – DIAGNOSTIC MODE

Because the Diagnostic Data is uncompressed, the grouped packets have fixed lengths. The structure for APIDs 830 to 853 is shown in Figure 4.4-32 to Figure 4.4-34. Like the Operational Science data, the grouped packets are output once per VIIRS scan (1.7864 sec). The User Data Fields listed in Table 4.4.19 and Table 4.4.20 show the fixed length and positions of the fields.

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First Packet



Figure 4.4-32 VIIRS Diagnostic First Packet Format

|     | 10119 |  |  |
|-----|-------|--|--|
| BAT |       |  |  |



Figure 4.4-33 VIIRS Diagnostic Middle Packet Format

Last Packet

| Verson<br>No.<br>T<br>Indi<br>Detets<br>Value<br>000 | Packet Ider<br>ype Sec<br>cator F1<br>1 1<br>2<br>0 0 | Hdr APID<br>ag 11<br>0 varies    | Packet<br>Contro<br>Sequence<br>Flags<br>2 | Sequence<br>ol (PSC)<br>Sequence<br>Count | Packet<br>Length | VIIRS P           | acket ID                           |                                    | HR Format             |            | HR Science Data    |              | 1      |
|------------------------------------------------------|-------------------------------------------------------|----------------------------------|--------------------------------------------|-------------------------------------------|------------------|-------------------|------------------------------------|------------------------------------|-----------------------|------------|--------------------|--------------|--------|
| Bits 3<br>Cotets Value 000                           | ype Sec<br>cator Fl<br>1 1<br>2<br>0 (                | Hdr APID<br>ag<br>. 11<br>varies | Sequence<br>Flags<br>2                     | Sequence<br>Count                         | Deligen          |                   |                                    |                                    |                       |            |                    |              |        |
| Bits 3 Crets Value 000                               | cator F1                                              | ag<br>11<br>varies               | Flags<br>2                                 | Count                                     |                  | VIIRS             | Packet                             | Format                             | Instrument            | Reserved   | HR Detector Data   | Pad Byte     | t      |
| Bits 3<br>Dctets<br>Value 000                        |                                                       | . 11<br>varies                   | 2                                          |                                           |                  | Sequence<br>Count | Time                               | Version                            | Number                |            |                    | as<br>needed |        |
| Octets<br>Value 000                                  |                                                       | varies                           |                                            | 14                                        | 16               | 32                | 64                                 | 8                                  | 8                     | 16         | varies             | 8            | varies |
|                                                      | )                                                     |                                  | 10 \                                       | 2<br>varies                               | 2<br>varies      | 4<br>varies       | 8<br>varies                        | 2                                  | 2                     | 2<br>zeros | varies             | , zeros      | varies |
|                                                      | ١                                                     | No. Consudant                    | - \i                                       | Loot pookot o                             |                  | Same              | e format as spe                    | cifed in Middle                    | e Packet              |            |                    | /            | •      |
|                                                      |                                                       | Header                           | 1 1                                        | Segmented of                              | data             | descri            | iption. Conten<br>intinuation of b | t will be single<br>and error data | detector's data       | 1          |                    | u/           |        |
|                                                      |                                                       |                                  |                                            |                                           |                  | Lengt             | h of HR Detec                      | tor Data field:                    |                       |            | Optional as needed | IP           |        |
|                                                      |                                                       |                                  |                                            |                                           |                  | Mode<br>Imagi     | rate Resolution                    | n Bands 286<br>Bands 563           | 0 octets<br>36 octets |            |                    |              |        |
|                                                      |                                                       |                                  |                                            |                                           |                  | Day-N             | Night Band                         | 266                                | 4 octets              |            |                    |              |        |
| ock the NIPP CCP                                     | wohsito                                               |                                  |                                            |                                           | BILL             |                   |                                    |                                    |                       |            |                    |              |        |



A.

|           |      |               |                        | Units               | Conversion Coefficients (formula or C5.C4.C3.C2.C1.C0) |           |
|-----------|------|---------------|------------------------|---------------------|--------------------------------------------------------|-----------|
| Start Bit | Bit  | Mnemonic Name | Description            | OR                  | OR                                                     | Data Type |
| olar bit  | Size |               |                        | State Value         | State Name                                             | Data Type |
| 0         | 32   | N/A           | VIIRS Sequence Count   | N/A                 | N/A                                                    |           |
| 32        | 64   | N/A           | Parket Time            | N/A                 | N/A                                                    |           |
| 96        | 8    | N/A           | Format Version         | N/A                 | N/A                                                    |           |
| 104       | 8    | N/A           | Instrument Number      | N/A                 | N/A                                                    |           |
| 112       | 16   | N/A           | Snare                  | N/A                 | N/A                                                    | N/A       |
|           | 10   |               | HAM Side               | 0                   | HAM Side A                                             | 19//1     |
| 128       | 1    | N/A           |                        | 1                   | HAM Side B                                             | В         |
|           |      |               | Scan Synch             | 0                   | Servo OFF                                              |           |
| 129       | 1    | N/A           | ,                      | 1                   | Servo ON and Synchronized                              | В         |
|           |      |               | Self Test Data Pattern | 0000 <sub>b</sub> < | Live Data                                              |           |
|           |      |               |                        | 0001 <sub>h</sub> - | Test Pattern Data                                      | в         |
| 120       |      | N/A           |                        | 1111                |                                                        |           |
| 130       | 4    | N/A<br>N/A    | Deserved               | N/A                 | Ν/Δ                                                    | NIA       |
| 104       | 22   | N/A           | Reserved               | N/A                 | Ν/Δ                                                    | N/A       |
| 176       | 64   | N/A           | Scan Terminue          | N/A                 | N/A                                                    |           |
| 110       |      |               | Soneor Mode            | 0                   |                                                        | 0         |
|           |      |               |                        | 1                   |                                                        |           |
|           |      |               |                        | 2                   |                                                        |           |
|           |      |               |                        | 2                   | DIAGNOSTIC                                             | п п       |
|           |      |               |                        | 4                   |                                                        | 0         |
|           |      |               |                        | 5                   | OPERATIONAL NIGHT                                      |           |
| 240       | 8    | N/A           |                        | 6                   | SAFE                                                   |           |
|           |      |               | VIIRS Model            | 1                   | EDU Platform                                           |           |
|           |      |               |                        | 2                   | FU1                                                    |           |
|           |      |               |                        | 3                   | FU2                                                    | U         |
| 248       | 8    | N/A           |                        | 4                   | FU3                                                    |           |
|           |      |               | FSW Version            | 0                   | IMPOUND                                                |           |
|           |      |               |                        | 1                   | REV A                                                  | 1         |
|           |      |               |                        | 2                   | REV B                                                  | 0         |
| 256       | 16   | N/A           |                        | 3                   | REV C                                                  |           |
|           |      |               |                        |                     |                                                        |           |

### Table 4.4.19 VIIRS Diagnostic First Packet User Data Fields

|           | Bit  |               |                                                                 | Units                                                                                                                                                                 | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                                                                                                                                    |           |
|-----------|------|---------------|-----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name | Description                                                     | OR<br>State Value                                                                                                                                                     | OR<br>State Name                                                                                                                                                                                                                          | Data Type |
| 272       | 32   | N/A           | Band Control Word (BCW) Bit Field                               | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | U         |
| 272       | 9    | N/A           | BCW Don't Care                                                  | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | N/A       |
| 272       | 9    | N/A           | BCW Don't Care<br>BCW Band ID                                   | N/A<br>00001<br>00010<br>00111<br>00100<br>00101<br>00111<br>01000<br>01001<br>01010<br>01011<br>01101<br>01111<br>00001<br>10001<br>10010<br>10011<br>10010<br>10011 | N/A<br>DNB<br>M1<br>M2<br>M4<br>M3<br>11<br>12<br>M7<br>M5<br>M6<br>M13<br>M12<br>14<br>13<br>M10<br>M11<br>M8<br>M9<br>15<br>M16A<br>M16A<br>M16A                                                                                        | B         |
| 281       | 5    | N/A           |                                                                 | 10101                                                                                                                                                                 | M15<br>M14                                                                                                                                                                                                                                |           |
| 201       | 5    | 1073          | BCW Active/Width Bits                                           | 00<br>01<br>10                                                                                                                                                        | Inactive<br>Inactive<br>Normal                                                                                                                                                                                                            | в         |
| 286       | 2    | N/A           |                                                                 | 11                                                                                                                                                                    | Partial                                                                                                                                                                                                                                   |           |
| 288       | 2    | N/A           | BCW ASP Boards                                                  | 00<br>01<br>10                                                                                                                                                        | DNB<br>ASP1<br>ASP2<br>ASP3                                                                                                                                                                                                               | В         |
| 200       | 3    | N/A           | PCW/ ASP Channels                                               | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | NI/A      |
| 200       | 1    | N/A           | BCW Image/Moderate                                              | 0                                                                                                                                                                     | Image                                                                                                                                                                                                                                     | B         |
| 200       | -    | N/A           |                                                                 | NZA                                                                                                                                                                   | NA                                                                                                                                                                                                                                        |           |
| 294       | -    | N/A           | BCW Stagger (Delay 3 samples for the even number of pixel rows) | 10/2                                                                                                                                                                  | No.                                                                                                                                                                                                                                       | N/A       |
| 295       | 1    | N/A           | BCW – Single or multi (dual) band                               | 0                                                                                                                                                                     | Single<br>Multi                                                                                                                                                                                                                           | В         |
| 296       | 1    | N/A           | BCW Aggregation                                                 | 0<br>1                                                                                                                                                                | NO<br>Yes                                                                                                                                                                                                                                 | В         |
| 297       | 1    | N/A           | BCW Bowtie                                                      | 0<br>1                                                                                                                                                                | No Bow Tie Deletion<br>Bow Tie Deletion Applied                                                                                                                                                                                           | в         |
| 298       | 1    | N/A           | BCW Save as Predictor or TDI                                    | 0                                                                                                                                                                     | No storage done<br>Band stored in Scan Predictor RAM                                                                                                                                                                                      | в         |
| 299       | 1    | N/A           | BCW Spectral DPCM                                               | 0                                                                                                                                                                     | No DPCM<br>DPCM Performed                                                                                                                                                                                                                 | В         |
| 300       | 1    | N/A           | BCW Dual Out Sum                                                | 0                                                                                                                                                                     | No averaging performed<br>Current band is averaged with the band                                                                                                                                                                          | В         |
| 301       | 3    | N/A           | BCW Discontinuity Correction                                    | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7                                                                                                                                  | No Discontinuity offset<br>Discontinuity Offset Register 1<br>Discontinuity Offset Register 2<br>Discontinuity Offset Register 3<br>Discontinuity Offset Register 4<br>Discontinuity Offset Register 5<br>Discontinuity Offset Register 7 | U         |
| 304       | 16   | N/A           | First Sample Count                                              | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | U         |
| 320       | 16   | N/A           | Number of Samples                                               | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | 1 Ū       |
| 336       | 960  | N/A           | Reserved                                                        | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       | N/A       |
| 1296      | 16   | N/A           | Check Sum                                                       | N/A                                                                                                                                                                   | N/A                                                                                                                                                                                                                                       |           |
| 1200      |      |               |                                                                 |                                                                                                                                                                       |                                                                                                                                                                                                                                           | 0         |
|           |      |               |                                                                 |                                                                                                                                                                       |                                                                                                                                                                                                                                           |           |

# Table 4.4.19 VIIRS Diagnostic First Packet User Data Fields (cont)
| Start Bit | Bit<br>Size | Mnemonic Name | Description                                 | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|---------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 32          | N/A           | VIIRS Sequence Count                        | N/A                        | N/A                                                                        | U         |
| 32        | 64          | N/A           | Packet Time                                 | N/A                        | N/A                                                                        | U         |
| 96        | 8           | N/A           | Format Version                              | N/A                        | N/A                                                                        | U         |
| 104       | 8           | N/A           | Instrument Number                           | N/A                        | N/A                                                                        | U         |
| 112       | 16          | N/A           | Spare                                       | N/A                        | N/A                                                                        | N/A       |
|           |             |               | Integrity Check                             | 0                          | No Error                                                                   | В         |
| 128       | 1           | N/A           | Indicates Corrupted Detector Data           | 1                          | Error                                                                      |           |
|           |             |               | Self Test Data Pattern                      | 0000 <sub>b</sub>          | Live Data                                                                  | В         |
|           |             |               |                                             | 0001 <sub>b</sub> -        | Test Data patterns                                                         |           |
| 100       |             | NZA           |                                             | 1111                       |                                                                            |           |
| 129       | 4           | N/A           | Decented                                    | N/A                        | Ν/Λ                                                                        | NI/A      |
| 100       | - 11        | N/A           | Reserved                                    | N/A                        | IWA                                                                        |           |
| 144       | 0           | NZA           | Ddilu<br>Dauthean internal data field       | NZA                        | N/A                                                                        | N/A       |
| 144       | 0           | N/A           | Raylineon Internal Gata Heig.               | N/A                        | N/A                                                                        | N/A       |
| IJZ       | 0           | N/A           | Supe Word Battern                           | 11/7                       | N/A                                                                        |           |
| 160       | 22          | N/A           | Sylic Wold Pattern                          | N/A                        | Ν/Λ                                                                        |           |
| 100       | 510         | N/A           | Sync Verily Data Patient . UXFF000005       | N/A                        | N/A                                                                        | U         |
| 704       | 012         | N/A           | Aggregation 1 or 22 17 Fill Data All zono   | N/A<br>N/A                 | N/A                                                                        | N/A       |
| 704       | 0           | N/A           | Aggregation 1 or 32-17 Fill Data All Zeros  | N/A                        | N/A                                                                        | N/A       |
| / 10      | 0           | N/A           | Aggregation 1 or 32-17 Fill Data leselveu   | N/A                        | IN/A<br>Last comproceed data located in hite 00:15 of last data word       | NA        |
| 715       | 4           | N/A           | Aggregation 1 of 52-17 Fill Data X Tielu    | 0                          | Last compressed data located in bits 00.10 of last data word               | Р         |
| 710       | 1           | N/A           | Aggregation 1 or 20 17 Fill Data undefined  | N/A                        |                                                                            | B         |
| 710       | 4           | N/A           | Aggregation 1 Of 52-17 Fill Data Underlined | N/A                        |                                                                            |           |
| 726       | 20640       | N/A           | Aggregation 1 Check Sum Onset               | N/A                        | Ν/Λ<br>Ν/Δ                                                                 |           |
| 21376     | 20040       | N/A           | Aggregation 1 Check Sum                     | N/A                        | Ν/Δ                                                                        |           |
| 21370     | 32          | Ν/Δ<br>Ν/Δ    | Aggregation 1 Sineck Sum                    | N/A                        | Ν/Δ                                                                        | U         |
| 21400     | 32<br>8     | N/A           | Pad byte (as needed)                        | N/A                        | Ν/Δ                                                                        | 0         |
| 21440     | 0           | N/A           | Pau byle (as needed)                        | IN/A                       | INA                                                                        | IN/A      |
|           |             |               |                                             |                            |                                                                            |           |

# Table 4.4.20 VIIRS Diagnostic Middle and Last Packet User Data Fields

### 4.4.7.5 Dwell Data

Diagnostic Dwell telemetry (APID 773) can replace normal health and status telemetry (APID 768) and is selectable by command. The Diagnostic Dwell telemetry frame has the same packet structure as the Health & Status telemetry packet, which is documented in the NPP Spacecraft Command and Telemetry Handbook. The Dwell packet is output once every scan.



# Figure 4.4-35 VIIRS Dwell Packet Format

Figu.

| Start Bi | Bit<br>Size | Mnemonic Name | Description          | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|----------|-------------|---------------|----------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0        | 32          | N/A           | VIIRS Sequence Count | N/A                        | NA                                                                         | U         |
| 32       | 64          | N/A           | Packet Time          | N/A                        | NA                                                                         | U         |
| 96       | 8           | N/A           | Format Version       | N/A                        | N/A                                                                        | U         |
| 104      | 8           | N/A           | Instrument Number    | N/A                        | N/A                                                                        | U         |
| 112      | 16          | N/A           | Spare                | N/A                        | N/A                                                                        | N/A       |
| 128      | 16          | N/A           | FSW Version          | N/A                        | N/A                                                                        | U         |
| 144      | 64          | N/A           | Reserved             | N/A                        | NA                                                                         | N/A       |
| 208      | 3232        | N/A           | Telemetry Values     | N/A                        | NA                                                                         | U         |
| 3440     | 16          | N/A           | User Checksum        | N/A                        | N/A                                                                        | U         |

Table 4.4.21 VIIRS Dwell Packet User Data Fields

<image>

# 4.4.7.6 Memory Dump

The Memory Dump Packet (APID 780) is initiated in response to a dump command. The dump packet structure parallels the memory load packet structure and contains a Format Header, Memory Dump Header, Memory Dump Data, and Checksum. Dump Packets are grouped packets and are restricted to 65,506 octets per CCSDS packet. There is a maximum of 256 CCSDS packets per packet group.

The Format Header contains the VIIRS sequence count, the packet time, the software version, the instrument number, and 16 spare bits.

The Memory Dump Header contains the memory address, the amount of memory dumped, the type of memory dumped, and 8 spare bits. There are three types of memory that can be dumped: RAM, EEPROM, and Tables. The MEM Select indicates the type of memory selected for the dump: 0 - RAM, 1 - EEPROM, and 2 - Table. There are two16-bit MEM Address subfields. For RAM and EEPROM dumps, they are the memory target address most significant word (MSW) and least significant word (LSW). The target address is the start address for the memory dumped. For tables they indicate the Table ID (TID) and offset in words (OIW) of where the data was read. The MEM Data Size field reflects the number of octets remaining to be dumped in the current and any following packets of the same grouped packet. This field is an even number of octets and does not include the checksum. The MEM Data field contains the actual memory or table data and is an even number of octets.

Finally, there is a User Check Sum, which is an arithmetic check sum of octets in the User Data Field (modulo 65536).

Thirty-seven uploadable tables control the configuration and operation of the VIIRS. Each of these can be included in the Memory Dump packet. The largest memory area possible to dump, 4 MB, requires a group of 65 packets. The timestamp in the Secondary Header represents the time the memory is captured.

The VIIRS uses either grouped or ungrouped packets depending on the size of the memory dump. Figure 4.4-36 through Figure 4.4-39 illustrate the structure of the memory dump packets. Table 4.4.22 lists the user data fields.

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Figure 4.4-36 VIIRS Ungrouped Memory Dump Packet Format





Figure 4.4-38 VIIRS Grouped Memory Dump Middle Packet Format



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| Start Bit | Bit<br>Size | Mnemonic Name | Description                        | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 32          | N/A           | VIIRS Sequence Count               | N/A                        | NA                                                                         | U         |
| 32        | 64          | N/A           | Packet time                        | N/A                        | NA                                                                         | U         |
| 96        | 8           | N/A           | SW version (Format Header)         | N/A                        | NA                                                                         | U         |
| 104       | 8           | N/A           | Instrument (Format Header)         | N/A                        | NA                                                                         | U         |
| 112       | 16          | N/A           | Spare (Format Header)              | N/A                        | NA                                                                         | N/A       |
| 128       | 32          | N/A           | MEM Address (Memory Dump Header)   | N/A                        | NA                                                                         | U         |
| 160       | 32          | N/A           | MEM Data Size (Memory Dump Header) | N/A                        | NA                                                                         | U         |
| 192       | 8           | N/A           | MEM Select (Memory Dump Header)    | N/A                        | N/A                                                                        | U         |
| 200       | 8           | N/A           | Spare (Memory Dump Header)         | N/A                        | N/A                                                                        | N/A       |
| 208       | varies      | N/A           | Memory DumpData                    | N/A                        | N/A                                                                        | U         |
| varies    | 16          | N/A           | User Check Sum                     | N/A                        | N/A                                                                        | U         |

Table 4.4.22 VIIRS Memory Dump Packet User Data Fields

#### 4.4.7.7 Test Packet

When commanded, VIIRS generates one fixed "Test Packet" per each scan until disabled by command. The Test Packet consists of a packet header with APID 770 and a fixed data pattern of 250 'CC' hex characters for a total of 256 bytes. VIIRS generates the Test Packet in Diagnostic mode and it is included with VIIRS Diagnostic packets in the NPP downlinks. Figure 4.4-40 shows the format of the VIIRS Test Packet.



### 4.5 CERES

#### 4.5.1 Introduction

The Clouds and the Earth's Radiant Energy System (CERES) trends the Earth's radiation budget by measuring solar-reflected and Earth-emitted radiation from the top of the atmosphere to the Earth's surface. In combination with other NPP instruments, it contributes to determining cloud properties. The CERES instrument provides radiometric measurements of the Earth's atmosphere from three broadband bolometer sensor channels: a shortwave channel ( $0.3 \ \mu m - 5.0 \ \mu m$ ), a total channel ( $0.3 \ \mu m - 100 \ \mu m$ ), and an infrared window (longwave) channel ( $8.2 \ \mu m - 11.8 \ \mu m$ ). The instrument can scan the sensors in two axes, azimuth and elevation. The CERES will scan primarily in an elevation plane orthogonal to the NPP satellite forward velocity. This normal cross-track scan takes 6.6 seconds, starting at a view of space beyond the Earth's limb, scanning 140 degrees across nadir and beyond the opposite Earth limb to a space view, continuing to an internal calibration system, and returning again. A view of the CERES is in Figure 4.5-1.



Figure 4.5-1 CERES Instrument

The CERES has no requirements for generating NPP EDRs. The CERES data produce Climate Data Records of Earth's radiative fluxes.

### 4.5.2 Instrument Function

There are two major instrument assemblies; the sensor scan assembly (SSA) and the pedestal assembly. The sensor scan assembly is mounted to a rotating azimuth gimbal allowing rotation of the entire assembly. The stationary pedestal/baseplate is mounted to the spacecraft. An exploded view of the instrument is shown in Figure 4.5-2.



Figure 4.5-2 CERES Exploded View

The Sensor Scan Assembly (SSA) consists of the following subassemblies: the sensor module assembly (SMA), the biaxial scan assembly (BSA), the internal calibration module (ICM) consisting of a shortwave calibration lamp (SWICS) and a blackbody assembly (ICSBB), the mirror attenuator mosaic (MAM) assembly, the sun presence sensors (SPS), the alignment cube assembly, the data acquisition assembly (DAA), and the data acquisition converter assembly (DCA). The entire assembly can be rotated in azimuth by command.

The Sensor Module Assembly (SMA) consists of three sensors mounted on a common support plate. Each sensor has a two-element reflective telescope, stray light baffling, and a pair of thermistor bolometer flakes configured as active and compensating elements. One sensor assembly provides no optical spectral filtering, and is referred to as the total channel (TC). The other channels employ spectral bandpass filters to implement shortwave (SW) and longwave (LW) channel responses.

The ICM sources provide repeatable radiation levels to calibrate all three sensors. The blackbody source, a temperature-controlled cavity, calibrates the TC and LW channel. The SWICS, a programmable incandescent tungsten lamp and photodiode, is used to calibrate the SW channel. It also verifies the SW channel MAM calibration results. The MAM provides an attenuated solar calibration source. Its indented surface reflects sunlight during solar calibration that calibrates the SW and TC channels.

The Biaxial Scan Assembly (BSA) consists of the elevation drive, the elevation control assembly (ECA), the azimuth drive, the azimuth brake/caging mechanism, as well as contamination cover, MAM cover and solar sensors. The SMA and telescopes are mounted on the elevation gimbal assembly. A brushless DC motor drives the assembly;

a 16-bit optical encoder determines its absolute position. A magnetic detent is used to cage the elevation drive assembly in the stowed position. The elevation drive is used to sweep the sensors field of view across the earth.

The ECA houses the electronic circuitry that controls the scanning motion of the elevation gimbal, reads the gimbal position from the encoder and also drives the motors for the main contamination cover and the MAM cover. The azimuth drive rotates the entire SSA through 350 degrees of a circle. The azimuth drive is prevented from rotating >350 degrees by means of a hard stop located on the outside flange of the motor. A brushless DC motor (similar to the elevation drive) drives the azimuth of the SSA. Control for the azimuth drive is located in the Azimuth Control Assembly located on the instrument pedestal. Rotating the brake against the azimuth drive shaft applies the brake. Caging of the azimuth drive is accomplished by first driving the azimuth to the cage position near the zero degree orientation. Then the azimuth brake is rotated until the azimuth drive is effectively caged.

The Data Acquisition Assembly (DAA) houses the microprocessor controller for the SSA, analog and digital circuitry used for conditioning and digitizing the main sensor signals as well as sensor channel and blackbody heater drivers, SWICS control and monitoring electronics, and solar sensor interface electronics. To minimize noise on the sensitive signal lines the DAA is partitioned into 3 separate sections: the filter section, the analog section and the digital section. The digital section contains the Data Acquisition Processor (DAP) and the digital input/output circuitry. The analog section includes the A/D converter and the heater driver circuitry. The A/D converter handles conversion of sensor signals and telemetry signals of the SSA. The heater driver circuitry provides a precision temperature control loop for the heater in the sensors. The filter section of the DAA contains the signal conditioning and filters for the main sensor signals, and the signal conditioners and multiplexers for the sensor module telemetry. The filter section also contains power regulators for the power supplied to the sensor module and filters and for the power supplied to the analog section of the DAA.

The Data Acquisition Converter Assembly (DCA) houses the power converter assemblies that provide power for the sensor electronics and the analog to digital converters (ADC). Power for these items is isolated from the rest of the instrument electronics. The DCA also houses the 130 Volt high voltage power converter for the sensor bridge excitation. Finally the DCA houses the power converter for the survival heaters used on the SSA. A cutoff circuit shuts down the survival converter whenever 28 Volts is present on the inputs to the operational converters.

The pedestal assembly provides the main load path for environmental forces during launch and provides structural support for the instrument during the mission. It consists of the baseplate, the Instrument Control Assembly (ICA), the Azimuth Control Assembly (ACA), the Power Converter Assembly (PCA) and power diode filter assembly. The overall instrument operations are under control of the ICA. The spacecraft interface board (SCIF) within the ICA Control Processor (ICP) is responsible for receiving, verifying and routing of instrument commands and for formatting and transmitting instrument telemetry. The ICA controls operation of the azimuth gimbal through the Azimuth Control Assembly and operates the azimuth brake mechanism.

The instrument collects a single set of telemetry and formats it into two streams: science telemetry and housekeeping telemetry. The housekeeping telemetry is a subset of the

science telemetry. All data found in the housekeeping telemetry may be found in the science telemetry. The instrument generates housekeeping telemetry at a rate of 2048 bits every 6.6 seconds. Science data is generated at a rate of 1 packet every 6.6 seconds.

### 4.5.3 Modes and Packet Structure

The CERES has the following modes of operation described below:

- Off/Launch
- Survival
- Safe
- Diagnostic
- Science

Figure 4.5-3 is a simplified diagram showing the CERES mode transitions. The CERES FM5 Instrument Operations Manual comprehensively describes all CERES modes and scan types. The CERES proceeds through an Initialization mode to Safe mode when first activated. After commanded to the Standby/Hold Science mode, internal sequences of commands then determine the Science sub-mode. As long as the internal sequences are used to configure CERES, the telemetry parameter ISEQMODE indicates the mode of the instrument. If individual commands are used, the ISEQMODE parameter will not necessarily reflect the CERES mode. The instrument can transition autonomously to Safe mode via internal sequence from any mode.

| VC<br>ID | APID <sub>10</sub> | Telemetry Packet<br>Name | Data Rate (bps) by<br>Mode   | Dow          | nlink        | Packet<br>Size |
|----------|--------------------|--------------------------|------------------------------|--------------|--------------|----------------|
|          |                    |                          | Operational or<br>Diagnostic | HRD          | SMD          | (octets)       |
| 0        | 146                | Housekeeping<br>Packet   | Note 1                       | ~            | ~            | Note 1         |
| 23       | 147                | Calibration              | 8477.6                       | $\checkmark$ | $\checkmark$ | 6994           |
| 23       | 148                | Fixed Pattern            | 8477.6                       | $\checkmark$ | $\checkmark$ | 6994           |
| 23       | 149                | Science                  | 8477.6                       | $\checkmark$ | $\checkmark$ | 6994           |
| 23       | 150                | Diagnostic (Note 2)      | 8477.6                       | $\checkmark$ | $\checkmark$ | 6994           |
| 0        | 155                | LEO&A                    | Note 1                       | $\checkmark$ | $\checkmark$ | Note 1         |

 Table 4.5.1 CERES Mission Data Packet Types

1. Documented in the NPP Command & Telemetry Handbook

2. The Diagnostic Packet may contain sensor data, memory dump data, gimbal data, or execution time data depending on what is commanded into it. The format is the same, only the content of the fields changes.

The CERES data packets, their size and data rates are listed in Table 4.5.1. The packets output by the CERES depend on the internal sequence used to configure the instrument and any individual commands overriding the internal sequence. Because individual commands allow any of these packets to be output in any mode, Table 4.5.1 does not distinguish the packet data rates by mode. Table 4.5.2 indicates the Mission Data packet type for a given instrument mode when commanded by internal sequence. Whenever the CERES is powered it outputs one of four types of Mission Data packets – Science packets, Calibration packets, Diagnostic packets and Fixed Pattern packets. Fixed Pattern packets will not be used on orbit and are not described in this document. The CERES packets also uses an 'internal data indicator' flag to further identify the data Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

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as science, calibration, or one of several types of diagnostic data. The packets output as a result of the CERES internal sequences are described with each mode in the sections below.

| Mode ID | Mode               | Mission Data Packet Type |
|---------|--------------------|--------------------------|
| 0       | Launch (Off)       | None                     |
| 1       | Survival           | None                     |
| 2       | Initialization     | N/A                      |
| 3       | Safe               | Diagnostic               |
| 4       | Diagnostic         | Diagnostic               |
| 5       | Standby/Hold       | Diagnostic               |
| 6       | Cross-Track        | Science                  |
| 7       | Biaxial            | Science                  |
| 8       | Solar Calibration  | Calibration              |
| 9       | Contamination Safe | Diagnostic               |

 Table 4.5.2 CERES Mission Data Packets by Internal Sequence



Figure 4.5-3 CERES Simplified Mode Diagram

# 4.4.7.8 Off, Launch and Survival Modes

The CERES is launched with operational power removed and with survival heater power removed. In Survival mode, only survival heater power is applied. No data are output in any of these modes. Survival mode instrument temperatures are monitored by means of passive temperature sensors via spacecraft telemetry.

### 4.4.7.9 Safe Mode

The Safe mode allows the instrument to be put into a configuration that will prevent damage to the instrument in the event of a loss of spacecraft operational power or attitude control. The transition to Safe Mode can be executed at any time. The motion of the both axes is stopped and the azimuth brake is applied. The instrument outputs the Diagnostic, Housekeeping and LEO&A packets. Since the telescope is stowed, the science packet data indicator in the Diagnostic packet is set to 'No\_Archive\_Data'.

# 4.4.7.10 Diagnostic Mode

Diagnostic mode is meant for CERES table loads, troubleshooting and instrument configuration changes not allowed in the other modes. Loads of the scan table, the internal sequence command table, and memory will occur when the CERES is in real-time contact with the ground. The Housekeeping and LEO&A packets are active, as well as Diagnostic packet with the data indicator flag set to 'No\_Archive\_Data'. Other Diagnostic, Science or Calibration packets can be enabled by command.

### 4.4.7.11 Science Modes

Brief descriptions of the sub-modes within Science Mode are given below. The submode determines whether Science or Calibration packets are generated and what type of data is in the Science packet, unless the internal sequence configuration is overridden by ground commands.

# 4.5.3.1.1 Cross-track Scan Mode

In the Cross-track Scan mode, the elevation gimbal performs either a normal-Earth, short-Earth or nadir scan while the azimuth gimbal holds its position fixed. The normal-Earth scan shown in Figure 4.5-4 will be used as the primary science mode for NPP. It starts with the sensors viewing Space, scans across Earth, pauses at a space view, proceeds to dwell on the internal calibration source and then reverses itself. Science packets are produced once per scan, every 6.6 seconds. The CERES continues to output the Housekeeping and LEO&A packets.

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Figure 4.5-4 CERES Normal Earth Scan Elevation Profile

# 4.5.3.1.2 Biaxial Scan Mode

Both the azimuth and elevation gimbals are active in this mode. The elevation drive typically executes a normal-Earth scan. It can switch to a short-Earth scan depending on the Sun orientation. The azimuth gimbal rotates back and forth 180 degrees. The Biaxial Scan mode is not intended to be used on NPP.

# 4.5.3.1.3 Solar Calibration Mode

Solar calibrations are performed approximately every two weeks in one of two ways. First, the azimuth gimbal is positioned so solar radiation is incident of the MAM surface. The elevation drive switches between solar, MAM and ICS views, as shown in Figure 4.5-5. Alternately, the azimuth gimbal scans the MAM baffle from space across the sun to space and back while the elevation gimbal positions the sensors to maintain a constant view of the MAM. This scanning continues while the sun sets through the MAM baffle field-of-view. In addition to Housekeeping and LEO&A packets, the CERES produces the Calibration packet in this mode. Science packets are not produced when the internal sequence is used.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.



Figure 4.5-5 CERES Solar Calibration Scan Elevation Profile

# 4.5.3.1.4 Contamination Safe Mode

The CERES stows the elevation gimbal, rotates the azimuth drive to a contaminationsafe position and turns off all calibration sources in Contamination Safe mode. The instrument remains in this mode for 10 minutes unless interrupted by internal command sequence to go to Safe or Standby or to reenter Contamination Safe mode. Upon expiration of waiting period, the CERES will transition to Standby mode. While in Contamination Safe, the Diagnostic, Housekeeping and LEO&A packets are output. The data indicator in the Diagnostic packet is set to 'No\_Archive\_Data'.

# 4.5.3.1.5 Standby/Hold Mode

The standby/hold mode is used to transition the CERES between Science modes and from Safe to Science mode. The CERES is operationally ready in this mode, though the elevation gimbal is stowed. It outputs the Diagnostic, Housekeeping and LEO&A packets. The data indicator in the Diagnostic packet is set to 'No\_Archive\_Data'.

# 4.5.4 Mission Data

The CERES transfers its CCSDS-formatted data to the spacecraft over the 1553B bus. The Science, Calibration, and Diagnostic packets all have the same basic format with slight customizations for each one. All packets start with a six byte primary header and an 8-byte secondary header. The timestamp in the secondary header represents the time at the beginning of each 6.6-second scan. The timestamp is in the standard UTC format in Table 4.1.3.

Because the CERES was built before NPP/NPOESS, its mission data packets differ from the other instruments in two significant ways. First, the CERES does not have a Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

separate engineering packet. Secondly, it does not exclude housekeeping telemetry from its mission data packets. Instead, housekeeping and engineering data are contained in each of the mission data packets. The tables showing the CERES packet content in the following sections are abbreviated mainly because the engineering data is multiplexed with the detector data. The CERES outputs one engineering value every sample period, for a total of 660 engineering values every scan. Instead of showing the engineering data sampled with the three detector data values and gimbal positions at every sample period, a separate table will show the engineering data variables output with each of the 660 sample periods. The sampling is the same for all the mission data packets. All fields in the CERES data packets are big endian.

### 4.4.7.12 Science Data

The CERES generates one science data packet (APID 149) every 6.6 second scan cycle when none of the other Mission Data packets are active. Each packet begins with identification fields, contains 660 samples of engineering, sensor, and gimbal data, and ends with instrument housekeeping data. For each 10 msec sample period, the CERES reports one of 75 engineering data variables, the outputs of the shortwave, longwave and total channel sensors, and the elevation and the azimuth position. The 75 engineering data variables are not reported at equal intervals. Their order of occurrence repeats three times over the 6.6 second scan. The first 220 engineering data entries are listed separately in Table 4.5.4. These same fields are repeated in samples 220 to 439 and 440 to 659.

The CERES Science Data packet is 6994 bytes in length. Its structure is shown in Figure 4.5-6. When it is output, the average data rate is 8477.6 bps. The primary header is documented in the NPP X-band Data Format ICD. The secondary header contains the timestamp marking the beginning of the CERES scan. Its format is the standard UTC format in Table 4.1.3. The contents of the 6980-byte user data field are shown in Table 4.5.3. Listing all of the fields repeated 660 times is impractical, so fields 2 to 658 are consolidated on one line.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

| CERES Science Data   | a Packet                                        |                                                                                 |                                                                                  |                                                |               |             | VERSION             | Aqua          |                      |                     |                  | DATE :                | 7/31/2002           |                           |                |       |
|----------------------|-------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------------------------------------------|------------------------------------------------|---------------|-------------|---------------------|---------------|----------------------|---------------------|------------------|-----------------------|---------------------|---------------------------|----------------|-------|
|                      |                                                 |                                                                                 |                                                                                  |                                                |               | Fixed Pack  | et Length           | 6994 Oct      | ets                  |                     |                  | 6                     |                     |                           |                |       |
|                      |                                                 | PACKET PRIMAR                                                                   | / HEADER                                                                         |                                                |               | SECONDARY   | 1                   |               |                      |                     | User Data        | a Field               |                     |                           |                | -     |
| Versor               | Packet Io                                       | dentification                                                                   | Packet                                                                           | Sequence                                       | Packet        | HEADER      |                     |               |                      | CEH                 | RES Scienc       | e Data                |                     |                           |                |       |
| No.                  | Type S                                          | ec Hdr APID                                                                     | Contro<br>Sequence                                                               | ol (PSC)<br>Seguence                           | Length        | Time Data   | Dagkat              |               | Ma                   | in Data.            | First Rec        | cord                  |                     | Main                      | Instrumen      | E.    |
|                      | Indicator                                       | Flag                                                                            | Flags                                                                            | Count                                          |               |             | Identi-<br>fication | Engr.<br>Data | Shortwave<br>Channel | Longwave<br>Channel | Total<br>Channel | Elevation<br>Position | Azimuth<br>Position | Data,<br>Records<br>2-660 | Status<br>Data | TOTAL |
| Bits 3               | 1                                               | 1 11                                                                            | 2                                                                                | 14                                             | 16            | 64          | 80                  | 12            | 12                   | 12                  | 12               | 16                    | 16                  | 52720                     | 2960           | 55952 |
| Octets               | 2                                               | 1 95                                                                            | 11.                                                                              | 2<br>Waries                                    | 2<br>1848     | 8<br>varies | 10<br>varies        | maries        | 3<br>Varies          | varies              | 3<br>Varies      | 2<br>varies           | 2<br>Waries         | 6590<br>Waries            | 370<br>Waries  | 6994  |
| 0 = Teleme<br>Packet | try                                             | Secondary Hea<br>Present                                                        | ler                                                                              | Standalone                                     | Packet        |             |                     |               | R NG                 |                     |                  |                       |                     |                           |                |       |
|                      | CERES<br>Quick<br>Look Flag<br>8<br>1<br>varies | CERES Science<br>Packet Identi<br>Spare Packe<br>Info<br>8 16<br>1 2<br>0 varie | e Data<br>fication D.<br>Packet<br>Counter<br>16<br>2<br>s varies<br>Bite<br>(Pk | ata<br>Spare<br>32<br>4<br>0<br>5 0-3, the Pac | ket Data Indi | cator       |                     |               |                      |                     |                  |                       |                     |                           |                |       |
|                      |                                                 | <b>B</b> BBBBB                                                                  |                                                                                  | Figure                                         | 4.5-6         | CERES       | Scien               | ce Da         | a Pack               | et For              | mat              |                       |                     |                           |                |       |

of Chi

| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value              | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                        | Data Type |
|-----------|-------------|---------------|--------------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 0         | 6           | N/A           | unused                               | N/A                                     | N/A                                                                                                                                               | N/A       |
| 6         | 1           | QLOOKFLG      | Quick Look Flag                      | 0<br>1                                  | Quick Look Flag Not Set<br>Quick Look Flag Set                                                                                                    | В         |
| 7         | 1           | N/A           | unused                               | N/A                                     | N/A                                                                                                                                               | N/A       |
| 8         | 8           | N/A           | spare                                | N/A                                     | N/A                                                                                                                                               | N/A       |
| 16        | 4           | PKTIND        | Science Packet Data Indicator        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7-15 | Normal Science Data<br>Calibration Data<br>Memory Dump Data<br>Gimbal Data<br>Execution Time Data<br>No Archive Data<br>Fixed Pattern<br>Not Used | В         |
| 20        | 5           | PKTVERS       | Packet Data Version                  | N/A                                     | N/A                                                                                                                                               | N/A       |
|           |             |               |                                      | 0 1 2 3 4 5 6                           | FTM<br>PFM<br>FM1<br>FM2<br>FM3<br>FM4<br>FM5                                                                                                     |           |
| 25        | 5           | INSTR ID      | Instrument ID Number                 | 7-31                                    | Not Used                                                                                                                                          | в         |
| 30        | 1           | QLOOKFLG      | Science Packet Quicklook Flag Status | 0                                       | Quick Look Flag Not Set<br>Quick Look Flag Set                                                                                                    | В         |
| 31        | 1           | TIME_ID       | Packet Timecode Indicator            | 0<br>1                                  | Based on Spacecraft Timing<br>Based on Instrument Timing                                                                                          | В         |
| 32        | 16          | PKTCOUNT      | Packet Counter                       | N/A                                     | N/A                                                                                                                                               | N/A       |
| 48        | 32          | N/A           | spare                                | N/A                                     | N/A                                                                                                                                               | N/A       |
| 80        | 12          | N/A           | Engineering Data sample 0            | N/A                                     | N/A                                                                                                                                               | N/A       |
| 92        | 12          | N/A           | Shortwave Channel Data sample 0      | N/A                                     | N/A                                                                                                                                               | N/A       |
| 104       | 12          | N/A           | Longwave Channel Data sample 0       | N/A                                     | N/A                                                                                                                                               | N/A       |
| 116       | 12          | N/A           | lotal Channel Data sample 0          | N/A                                     | N/A                                                                                                                                               | N/A       |
| 128       | 16          | N/A           | Elevation Position sample 0          | N/A                                     | N/A                                                                                                                                               | N/A       |
| 144       | 16          | N/A           | Azimuth Position sample 0            | N/A                                     | N/A                                                                                                                                               | N/A       |
| 160       | 12          | N/A           | Engineering Data sample 1            | N/A                                     | N/A                                                                                                                                               | N/A       |
| 172       | 12          | N/A           | Shortwave Channel Data sample 1      | N/A                                     | N/A                                                                                                                                               | N/A       |
| 184       | 12          | N/A           | Longwave Channel Data sample 1       | N/A                                     | N/A                                                                                                                                               | N/A       |
| 196       | 12          | N/A           | Total Channel Data sample 1          | N/A                                     | N/A                                                                                                                                               | N/A       |
| 208       | 16          | N/A           | Elevation Position sample 1          | N/A                                     | N/A                                                                                                                                               | N/A       |
| 224       | 16          | N/A           | Azimuth Position sample 1            | N/A                                     | N/A                                                                                                                                               | N/A       |
| 240       | 52560       | N/A           | Samples 3-658                        | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52800     | 12          | N/A           | Engineering Data sample 659          | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52812     | 12          | N/A           | Shortwave Channel Data sample 659    | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52824     | 12          | N/A           | Longwave Channel Data sample 659     | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52836     | 12          | N/A           | I otal Channel Data sample 659       | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52848     | 16          | N/A           | Elevation Position sample 659        | N/A                                     | N/A                                                                                                                                               | N/A       |
| 52864     | 16          | N/A           | Azimuth Position sample 659          | N/A                                     | N/A                                                                                                                                               | N/A       |
|           |             |               |                                      |                                         |                                                                                                                                                   |           |

# Table 4.5.3 CERES Science Data Packet User Data Fields

| Start Bit | Bit<br>Size | Mnemonic Name | Description                           | Units<br>OR<br>State Value                                                                  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                   | Data Type |
|-----------|-------------|---------------|---------------------------------------|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 52880     | 5           | ISEQMODE      | Instrument Mode (Sequence #)          | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16-31 | Safe Mode<br>Standby Mode<br>Crosstrack Mode<br>Biaxial Mode<br>Solar Calibration Mode<br>Diagnostic Configuration Mode<br>Internal Calibration Mode<br>Special Short Scan Mode<br>Contamination Safte Mode<br>Hold Mode<br>Abbrev'd Internal Cal Mode<br>Internal Sequence 12 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 14 (Unused)<br>Internal Sequence 15 (Unused)<br>Internal Sequence 15 (Unused)<br>Not Available | В         |
| 52005     | -           | ISEODMODE     |                                       | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>15    | Safe Mode<br>Standby Mode<br>Crosstrack Mode<br>Biaxial Mode<br>Solar Calibration Mode<br>Diagnostic Configuration Mode<br>Internal Calibration Mode<br>Special Short Scan Mode<br>Contamination Safte Mode<br>Hold Mode<br>Abbrev6 Internal Cal Mode<br>Internal Sequence 11 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 14 (Unused)<br>Internal Sequence 15 (Unused)                   |           |
| 52885     | 5           | ISEQPHIODE    | Instrument Previous Mode (Sequence #) | 0<br>1<br>2<br>3                                                                            | Command<br>Safe Hold<br>Solar Avoidance<br>Scan Timeout                                                                                                                                                                                                                                                                                                                                                                                      | В         |
| 52890     | 3           | SEQCHG        | Mode (Sequence) Changed By            | 4-7                                                                                         | Not Used                                                                                                                                                                                                                                                                                                                                                                                                                                     | В         |
| 52893     | 2           | <br>N1/A      | Mode (Sequence) Has Been Changed      | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A       |
| 52895     | 1           |               | Spare                                 | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A       |
| 22090     | 5           | JEWINDEA      |                                       | 0<br>1<br>2<br>3                                                                            | N/A<br>Executing Sequence Cmds<br>Waiting for Next Scan Period<br>Waiting For Azimuth<br>Sequence Complete                                                                                                                                                                                                                                                                                                                                   |           |
| 52901     | 3           | SEQEXEC       | Sequence Execution Status             | 4-7                                                                                         | Not Used                                                                                                                                                                                                                                                                                                                                                                                                                                     | В         |
| 52904     | 8           | SEQTIME       | Sequence Time to Next Command         | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                          | N/A       |
| 52912     | 16          |               | Time Mark Sample Number               | N/A                                                                                         | 1023                                                                                                                                                                                                                                                                                                                                                                                                                                         | N/A       |
| 52928     | 16          |               | Time Mark Microseconds                | N/A                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A       |
| 52944     | 16          |               | Time Code Sample Number               | N/A                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A       |
| 52960     | 16          |               | Time Code Microseconds                | N/A                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A       |

| Bit<br>Son         Mnemonic Name         Description         Units<br>Of<br>Son use         Conversion Coefficients (Smills or 05,04,03,02,01,00)<br>State Type         Data Type           2020         16         OMCCUNT         Instrument Command Counter         NA         NA         NA           2020         16         OMCCUNT         Instrument Command Counter         NA         NA         NA           2020         16         OMCCUNT         Instrument Command Counter         NA         NA         NA           2020         18         COMAND         Instrument Com Stack fam 0 - Parm         NA         NA         NA           2020         18         COMAND         Instrument Cond Stack fam 0 - Parm         NA         NA         NA           2020         16         COMAND         Instrument Cond Stack fam 0 - Parm         NA         NA         NA           2020         16         COMAND         Instrument Cond Stack fam 0 - Parm         NA         NA         NA           2020         16         COMAND         Instrument Cond Stack fam 0 - Parm         NA         NA         NA           2020         1         Instrument Cond Stack fam 0 - Status         1         Instrument Cond Stack fam 1 - Parm         Instrument Cond Stack fam 1 - Parm         Inst                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |             |               | Table 4.5.3 CERES Science Data Packet | User Da                                                                               | Ita Fields (con't)                                                                                                                                                                                                                                                                                                                                                                                                              |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------------|---------------|---------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 5078         15         NA         Sare         NA         NA         NA         NA         NA           5078         16         CMDCOUO         Instance of Command and Thim         Caults         NA         NA         NA           3024         16         CDPARM 0         Instance of Command and Thim         CAUS         NA         NA         NA           3024         16         CDPARM 0         Instance of Com Stack Ism 0 - Parm         CM         NA         NA         NA           3024         10         Instance of Cod Stack Ism 0 - Sample         Cut         NA         NA         NA           3024         10         Instance of Cod Stack Ism 0 - Sample         0         Cod Accepted         NA         NA           3026         10         Instance of Cod Stack Ism 0 - Sample         0         Cod Isma         Cod I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Start Bit | Bit<br>Size | Mnemonic Name | Description                           | Units<br>OR<br>State Value                                                            | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                      | Data Type |
| 5992         16         CoMCOUNT         Instrument Condition         Counts         NA         NA         NA           5008         8         IDAMIA 0         Instrument Condition 0. Man         NA         NA         NA         NA           5018         10         IDAMIA 0         Instrument Condition 0. Man         NA         NA         NA         NA           5018         10         ICOMIA 0         Instrument Condition 0. Man         NA         NA         NA         NA           5010         10         Instrument Condition 0. Sample         Counts         NA         NA         NA           5010         Instrument Condition 0. Sample         0         Condition 0. Or dictage         1           7         Condition 0. Or dictage         1         Condition 0. Or dictage         1           7         Condition 0. Or dictage         1         Condition 0. Or dictage         1           7         Condition 0. Or dictage         1         Condition 0. Or dictage         1           5         ICSTAT_0         Instrument Condition 0. Stack tem 0. St                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 52976     | 16          | N/A           | Spare                                 | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A       |
| 53008         16         ICMAN 0         Instrument Crod Stack Item 0 - Nam         N/A         N/A         N/A           3024         10         ICSMPL 0         Instrument Crod Stack Item 0 - Sample         Counts         N/A         N/A         N/A           3034         10         ICSMPL 0         Instrument Crod Stack Item 0 - Sample         Counts         N/A         N/A         N/A           3044         10         ICSMPL 0         Instrument Crod Stack Item 0 - Sample         Counts         Crod Pacepted         1           3047         10         ICSMPL 0         Instrument Crod Stack Item 0 - Sample         Counts         Crod Pacepted         1           30         Crod Pacepted         1         Crod Pacepted         1         Crod Pacepted         1           30         Crod Pacepted         1         Crod Pacepted         1         1         1           31         Mode Net Allocon Command         1         1         1         1         1           320         5         ICSTAT_0         Instrument Crod Stack Item 0 - Stack         15.31         Pace Acv - Brace On         1           3202         1         ICSRC 0         Instrument Crod Stack Item 0 - Stack         1         Instrument Crod Stack Item 1 - S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 52992     | 16          | CMDCOUNT      | Instrument Command Counter            | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A       |
| 53024         16         IDPARM 0         Instrument Cmd Stack Item 0 - Sample         Outs         N/A         N/A           5304         10         ICSMPL_0         Instrument Cmd Stack Item 0 - Sample         0         Cmd Accopited         N/A         N/A           5304         10         ICSMPL_0         Instrument Cmd Stack Item 0 - Stample         0         Cmd Accopited         N/A           5304         10         ICSMPL_0         Instrument Cmd Stack Item 0 - Stample         0         Cmd Accopited         N/A           6         Molt Shate         0         Cmd Index Out of Range         Instrument Cmd Stack Item 0 - Stample         0         N/A         N/A           6         Not Accepted in Current mode         Not Accepted in Current mode         Not Accepted in Current mode         Instrument Cmd Stack Item 0 - Status         10         Cart Not Accepted in Current mode         8           5000         5         ICSTAT_0         Instrument Cmd Stack Item 0 - Status         14         Pos A Must Bor Pos B         8           5303         1         CARC 0         Instrument Cmd Stack Item 0 - Status         1         Not Used         8           5303         1         ICSRPC_0         Instrument Cmd Stack Item 1 - Stample         N/A         Not Used         8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 53008     | 16          | ICMAIN_0      | Instrument Cmd Stack Item 0 - Main    | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             |           |
| 5300         10         LCSMPL_0         Instrument Cmd Stack Item 0 - Sample         Counts         N/A         N/A         N/A           5300         1         Cmd Accepted         0         Cmd Mot Used         Cmd Mot Sol of Flange         0         Not a Valid Shot Command         8         Not a Valid Shot Command         0         Not a Valid Shot Command         0         Not a Valid Shot Command         10         Cast Mot A Valid Shot Command         10         Cast Mot A Valid Shot Command         10         Cast Mot A Valid Shot Command         10         10         Cast Mot A Valid Shot Command         10         10         Cast Mot A Valid Shot Command         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 53024     | 16          | ICPARM_0      | Instrument Cmd Stack Item 0 - Parm    | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             |           |
| star         star <td< td=""><td>53040</td><td>10</td><td>ICSMPL_0</td><td>Instrument Cmd Stack Item 0 - Sample</td><td>Counts</td><td>N/A</td><td>N/A</td></td<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 53040     | 10          | ICSMPL_0      | Instrument Cmd Stack Item 0 - Sample  | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A       |
| 1         ICSRC 0         Instrument Cmd Stack Item 0 - Source         0         Spacecraft           83065         16         ICMAIN, 1         Instrument Cmd Stack Item 1 - Main         Internal Sequence         B           83072         16         ICPARM, 1         Instrument Cmd Stack Item 1 - Parm         Internal Sequence         B           83072         16         ICPARM, 1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A           8308         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A           8308         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A           8         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         0         Cmd Accepted         2           9         Cmd Index Out of Range         3         Cmd Param Out of Range         3         1         Incorrect Checksum         6         Incorrect Checksum         1         1         Cant Move Az Brake On         1         1         Cant Move Az Brake On         1         1         1         1         1         1         1         1         1         1         1         1         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 53050     | 5           | ICSTAT 0      | Instrument Cmd Stack Item 0 - Status  | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-31 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Use Brake w- Az Moving<br>Can't Use Brake w- Az Moving<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B<br>Not Used | В         |
| S3056         16         ICMAR 1         Instrument Cmd Stack Item 1 - Main         1           33072         16         ICPARM 1         Instrument Cmd Stack Item 1 - Parm         N/A         N/A         N/A           S3088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A         N/A           S3088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         0         Cmd Accepted         1         Cmd Not Used         N/A         N/A           S3088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         0         Cmd Accepted         1         Cmd Not Used         1         2         Cmd Not Used         1         1         Cant Accepted in Canter Item Accept                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 53055     | 1           | ICSRC 0       | Instrument Cmd Stack Item 0 - Source  | 0                                                                                     | Spacecraft<br>Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                 | в         |
| Sa072         16         ICPARM_1         Instrument Cmd Stack Item 1 - Parm         N/A         N/A         N/A         N/A           53088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A         N/A         N/A           3088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A         N/A         N/A           3         Cmd Index Out of Range         1         Cmd Index Out of Range         3         Cmd Parage Out of Range         3         Cmd Parage Out of Range         3         Cmd Parage         3         Cmd Parage         4         Not a Valid Long Command         1         1         1         0         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 53056     | 16          | ICMAIN 1      | Instrument Cmd Stack Item 1 - Main    |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |
| 53088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         N/A         N/A         N/A           63088         10         ICSMPL_1         Instrument Cmd Stack Item 1 - Sample         0         Cmd Accepted<br>Cmd Not Used         0         Cmd Accepted         0         Cmd Not Used         0         Cmd Not Used         0         Cmd Not Used         0         Cmd Index Out of Range         3         Cmd Param Out of Range         0         N/A         N/A <t< td=""><td>53072</td><td>16</td><td>ICPARM 1</td><td>Instrument Cmd Stack Item 1 - Parm</td><td></td><td></td><td></td></t<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 53072     | 16          | ICPARM 1      | Instrument Cmd Stack Item 1 - Parm    |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |
| 0     0     Cmd Accepted<br>Cmd Not Used       1     Cmd Index Out of Range       2     Cmd Index Out of Range       3     Cmd Param Out of Range       4     Not a Vaild Short Command       5     Not a Vaild Short Command       6     Incorrect Checksum       7     Cmd Exceeded Mode Index       8     Not Accepted in Urrent mode       9     Not Accepted in Current mode       10     Can't More Az Woring       11     Can't More Az Woring       12     Can't More Az Wering       13     Mode Not Allowed In this Mode       14     Pos A Must Be < Pos B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 53088     | 10          | ICSMPL 1      | Instrument Cmd Stack Item 1 - Sample  | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                             | N/A       |
| 53098         5         ICSTAT_1         Instrument Cmd Stack Item 1 - Status         15-31         Not Used         B           53103         1         ICSRC_1         Instrument Cmd Stack Item 1 - Source         0         Spacecraft         B           53103         1         ICSRC_1         Instrument Cmd Stack Item 1 - Source         1         Internal Sequence         B           53104         16         ICMAIN_2         Instrument Cmd Stack Item 2 - Main         53120         16         ICPARM_2         Instrument Cmd Stack Item 2 - Parm         53130         10         ICSMUP1 2         Instrument Cmd Stack Item 2 - Sample         Counts         N/A         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |           |             |               | ALLO BUILSON A. W.                    | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14          | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B             |           |
| 53103         1         ICSRC_1         Instrument Cmd Stack Item 1 - Source         0         Spacecraft           53104         16         ICMAIN_2         Instrument Cmd Stack Item 2 - Main         B           53104         16         ICPARM_2         Instrument Cmd Stack Item 2 - Parm         Counts         N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 53098     | 5           | ICSTAT_1      | Instrument Cmd Stack Item 1 - Status  | 15-31                                                                                 | Not Used                                                                                                                                                                                                                                                                                                                                                                                                                        | В         |
| Image: Solution of the soluti | 52102     | 4           |               | Instrument Cmd Steel Item 1 Seurce    | 0                                                                                     | Spacecraft                                                                                                                                                                                                                                                                                                                                                                                                                      |           |
| 35104         10         10/WAIN_2         Instrument Ciril Stack Item 2 - Walth         10           53120         16         ICPARM_2         Instrument Ciril Stack Item 2 - Parm         10           53136         10         ICSMP1 2         Instrument Ciril Stack Item 2 - Parm         10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 53103     | 10          |               | Instrument Cmd Stack Item 1 - Source  | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                               | В         |
| JOI 20         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10         10 <th< td=""><td>52120</td><td>10</td><td></td><td>Instrument Cmd Stack Item 2 - Nidill</td><td></td><td></td><td></td></th<>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 52120     | 10          |               | Instrument Cmd Stack Item 2 - Nidill  |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                 |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 53120     | 10          |               | Instrument Cmd Stack Item 2 - Sample  | Counte                                                                                | Ν/Λ                                                                                                                                                                                                                                                                                                                                                                                                                             | NI/A      |

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value                                                                        | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                         | Data Type |
|-----------|-------------|---------------|--------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14                      | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w-Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B                                 |           |
| 53146     | 5           | ICSTAT_2      | Instrument Cmd Stack Item 2 - Status | 15-31                                                                                             | Not Used                                                                                                                                                                                                                                                                                                                                                                                                                                           | В         |
| 53151     | 1           | ICSRC 2       | Instrument Cmd Stack Item 2 - Source | 1                                                                                                 | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                  | в         |
| 53152     | 16          | ICMAIN_3      | Instrument Cmd Stack Item 3 - Main   | N/A                                                                                               | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| 53168     | 16          | ICPARM_3      | Instrument Cmd Stack Item 3 - Parm   | N/A                                                                                               | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| 53184     | 10          | ICSMPL_3      | Instrument Cmd Stack Item 3 - Sample | Counts                                                                                            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
| 52404     |             |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>11<br>12<br>13<br>14<br>4<br>5<br>2 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Gage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B |           |
| 53194     | 5           | ICSTAT_3      | Instrument Cmd Stack Item 3 - Status | 15-31                                                                                             | NOT USED<br>Spacecraft                                                                                                                                                                                                                                                                                                                                                                                                                             | В         |
| 53199     | 1           | ICSRC 3       | Instrument Cmd Stack Item 3 - Source | 1                                                                                                 | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                                                  | в         |
| 53200     | 16          | ICMAIN 4      | Instrument Cmd Stack Item 4 - Main   | N/A                                                                                               | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| 53216     | 16          | ICPARM_4      | Instrument Cmd Stack Item 4 - Parm   | N/A                                                                                               | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| 53232     | 10          | ICSMPL_4      | Instrument Cmd Stack Item 4 - Sample | Counts                                                                                            | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
|           |             |               |                                      |                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |

# Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value                                                            | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                     | Data Type |
|-----------|-------------|---------------|--------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13                | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode                                                                  |           |
| 53242     | 5           | ICSTAT 4      | Instrument Cmd Stack Item 4 - Status | 15-31                                                                                 | Not Used                                                                                                                                                                                                                                                                                                                                                                                                                       | в         |
|           |             |               |                                      | 0                                                                                     | Spacecraft                                                                                                                                                                                                                                                                                                                                                                                                                     | _         |
| 53247     | 1           | ICSRC_4       | Instrument Cmd Stack Item 4 - Source | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                              | В         |
| 53264     | 16          | ICNAIN_5      | Instrument Cmd Stack Item 5 - Nam    | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53280     | 10          | ICSMPL 5      | Instrument Cmd Stack Item 5 - Sample | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A       |
| 53290     | 5           | ICSTAT_5      | Instrument Cmd Stack Item 5 - Status | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-31 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B<br>Not Used | в         |
| 53295     | 1           | ICSBC 5       | Instrument Cmd Stack Item 5 - Source | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                              | в         |
| 53296     | 16          | ICMAIN 6      | Instrument Cmd Stack Item 6 - Main   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            | 1 -       |
| 53312     | 16          | ICPARM_6      | Instrument Cmd Stack Item 6 - Parm   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53328     | 10          | ICSMPL_6      | Instrument Cmd Stack Item 6 - Sample | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A       |
|           |             |               |                                      |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                |           |

# Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                            | Units<br>OR<br>State Value                                                            | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                          | Data Type    |
|-----------|-------------|---------------|----------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|
|           |             |               |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14          | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B |              |
| 53338     | 5           | ICSTAT_6      | Instrument Cmd Stack Item 6 - Status   | 15-31<br>0                                                                            | Not Used<br>Spacecraft                                                                                                                                                                                                                                                                                                                                                                                              | В            |
| 53343     | 1           | ICSRC_6       | Instrument Cmd Stack Item 6 - Source   | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                   | в            |
| 53344     | 16          | ICMAIN_7      | Instrument Cmd Stack Item 7 - Main     | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 |              |
| 53360     | 16          | ICPARM_7      | Instrument Cmd Stack Item 7 - Parm     | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 |              |
| 53376     | 10          | ICSMPL_7      | Instrument Cmd Stack Item 7 - Sample   | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A          |
| 53386     | 5           | ICSTAT_7      | Instrument Cmd Stack Item 7 - Status   | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-31 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B<br>Not Used                  | в            |
| 53391     | 1           | ICSRC 7       | Instrument Cmd Stack Item 7 - Source   | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                   | в            |
| 53392     | 16          | ERRCOUNT      | Instrument Error Counter               | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A          |
| 53408     | 10          | ERSMPL_0      | Instrument Error Stack Item 0 - Sample | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 | N/A          |
| 53408     | 10          |               | Instrument Error Stack Item 0 - Sample | Counts                                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                 | <u>  N/A</u> |

# Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

|                | Bit     |                      |                                                                             | Units                                                                                                                                             | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |
|----------------|---------|----------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit      | Size    | Minemonic Name       | Description                                                                 | OR<br>State Value                                                                                                                                 | State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Data Type |
| 52/18          | 6       | ERTYRE 0             | Instrument Error Stack Item 0 - Tune                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62<br>27-62 | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rovd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Eroke Pos Sensor<br>Main Covr Lag Exceeded<br>Science PKI Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used                                | В         |
| 53418<br>53424 | 6       | ERTYPE_0<br>ERSMPL_1 | Instrument Error Stack Item 0 - Type                                        | 63<br>Counts                                                                                                                                      | Undefined Error<br>N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B<br>N/A  |
|                |         |                      |                                                                             | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62          | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious ICP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Cover Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used |           |
| 53434          | 6<br>10 | ERTYPE_1<br>ERSMPL_2 | Instrument Error Stack Item 1 - Type Instrument Error Stack Item 2 - Sample | 63<br>Counts                                                                                                                                      | Undefined Error<br>N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | B<br>N/A  |

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                            | Units<br>OR<br>State Value                                                                                                                     | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Data Type |
|-----------|-------------|---------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 53450     | 6           | ERTYPE 2      | Instrument Error Stack Item 2 - Type   | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62<br>63 | No Error<br>Unexpected Interrupt<br>Illegal Intern'i Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used<br>Undefined Error            | В         |
| 53450     | 10          | ERSMPL_3      | Instrument Error Stack Item 3 - Sample | Counts                                                                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A       |
|           |             |               |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62       | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>Spurious ICP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used |           |
| 53466     | 6           | ERTYPE_3      | Instrument Error Stack Item 3 - Type   | 63<br>Counts                                                                                                                                   | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | B<br>N/A  |

# Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                              | Units<br>OR<br>State Value                                                                                                               | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Data Type  |
|-----------|-------------|---------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|
|           |             |               |                                          | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62 | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>Spurious ICP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used                                   |            |
| 53482     | 6           | ERTYPE_4      | Instrument Error Stack Item 4 - Type     | 63                                                                                                                                       | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | В          |
| 33466     |             |               |                                          | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>21<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62 | No Error<br>Unexpected Interrupt<br>Illegal Internil Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Short Cmd Illegal Cmd<br>Process Short Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rovd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskyg Destination Size<br>Spurious ICP Clk Interrupt<br>Spurious ICP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used |            |
|           |             |               | I water uncent Error Steels Items 5 Type | 62                                                                                                                                       | Lindefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            |
| 53498     | 6<br>10     | ERTYPE_5      | Instrument Error Stack Item 6 - Sample   | Counte                                                                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | - B<br>N/A |

Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value                                                                                                                           | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Data Type |
|-----------|-------------|---------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62             | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rovd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskyg Destination Size<br>Spurious DAP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK                                          |           |
| 53514     | 6           | ERTYPE_6      | Instrument Error Stack Item 6 - Type | 63                                                                                                                                                   | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | В         |
| 53520     | 10          | EROMIPL_/     |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>22<br>23<br>24<br>25<br>26<br>27-62 | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Revd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicafr Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskyg Destination Size<br>Spurious ICP Cik Interrupt<br>Spurious ICP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used | N/A       |
| 53530     | 6           | ERTYPE_7      | Instrument Error Stack Item 7 - Type | 63                                                                                                                                                   | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | В         |

|           |      |                |                                             | Linits            | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
|-----------|------|----------------|---------------------------------------------|-------------------|--------------------------------------------------------|-----------|
| Stort Dit | Bit  | Macmonio Nomo  | Description                                 |                   |                                                        | Data Tuna |
| Start Dit | Size | Whemonic Name  | Description                                 | OK<br>Chata Malua | Oh<br>Otata Nama                                       | Data Type |
|           |      |                |                                             | State value       | State Name                                             |           |
|           |      |                |                                             | 0                 | Bridge Balance Off                                     |           |
|           |      |                |                                             | 1                 | Bridge Balance Maintenance                             |           |
|           |      |                |                                             | 2                 | Bridge Balance Reset                                   |           |
| 52646     | 2    | TRADCCS        | Tatal Bridge Bel, Control Status            | 27                | Net Llood                                              | в         |
| 53010     | 3    | TBRDGC3        | Total Bridge Bal. Control Status            | 3-1               | Not Used                                               | D         |
|           |      |                |                                             | 0                 | DAC Value Unchanged                                    | _         |
| 53619     | 1    | TBRDGDVS       | Total Bridge Bal. DAC Update Status         | 1                 | DAC Value Updated                                      | В         |
| 53620     | 5    | TOTBRST        | Total Bridge Bal. Reset Calculation Counter | Counts            |                                                        | N/A       |
| 53625     | 7    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53632     | 12   | TOTBSLA        | Total Space Look Average                    | Counts            |                                                        | N/A       |
| 53644     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53648     | 12   | TBBDACC        | Total Bridge Bal. Coarse DAC Value          | Counts            |                                                        | N/A       |
| 53660     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53664     | 12   | TBBDACE        | Total Bridge Bal, Fine DAC Value            | Counts            |                                                        | N/A       |
| 53676     | 4    | N/A            | Snare                                       | N/A               | N/A                                                    | N/A       |
| 00070     | -    | 1077           | - Optic                                     | 0                 | Bridge Balance Off                                     | 10// (    |
|           |      |                |                                             | 1                 | Bridge Balance On<br>Bridge Balance Maintenance        |           |
|           |      |                |                                             |                   | Diluge Balance Maintenance                             |           |
|           |      |                |                                             | 2                 | Bridge Balance Reset                                   |           |
| 53680     | 3    | SBRDGCS        | SW Bridge Bal. Control Status               | 3-7               | Not Used                                               | В         |
|           |      |                |                                             | 0                 | DAC Value Unchanged                                    |           |
| 53683     | 1    | SBRDGDVS       | SW Bridge Bal. DAC Update Status            | 1                 | DAC Value Updated                                      | В         |
| 53684     | 5    | SWBRST         | SW Bridge Bal. Reset Calculation Counter    | Counts            |                                                        | N/A       |
| 53689     | 7    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53696     | 12   | SWBSLA         | SW Space Look Average                       | Counts            |                                                        | N/A       |
| 53708     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53712     | 12   | SWBBDACC       | SW Bridge Ball Coarse DAC Value             | Counts            | 10,1                                                   | N/A       |
| 53724     | 4    | N/A            | Share Share                                 | N/A               | N/Δ                                                    | N/A       |
| 53728     | 12   | SWBBDACE       | SW Bridge Ball Fine DAC Value               | Counts            | 1077                                                   | N/A       |
| 52740     | 12   | N/A            | Sty Bidge Bal. The DAG Value                | N/A               | Ν/Δ                                                    | N/A       |
| 55740     | 4    | IN/A           | Spare                                       | N/A               | N/A<br>Bridge Belance Off                              | 11/7      |
|           |      |                |                                             | 0                 | Didge Datafice Off                                     |           |
|           |      |                |                                             | 1                 | Bridge Balance Maintenance                             |           |
|           |      |                |                                             | 2                 | Bridge Balance Reset                                   |           |
| 53744     | 3    | LBRDGCS        | LW Bridge Bal. Control Status               | 3-7               | Not Used                                               | В         |
|           |      |                |                                             | 0                 | DAC Value Unchanged                                    |           |
| 53747     | 1    | LBRDGDVS       | LW Bridge Bal. DAC Update Status            | 1                 | DAC Value Updated                                      | В         |
| 53748     | 5    | LWBRST         | LW Bridge Bal. Reset Calculation Counter    | Counts            |                                                        | N/A       |
| 53753     | 7    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53760     | 12   | LWBSLA         | LW Space Look Average                       | Counts            |                                                        | N/A       |
| 53772     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53776     | 12   | LWBBDACC       | LW Bridge Bal, Coarse DAC Value             | Counts            |                                                        | N/A       |
| 53788     | 4    | N/A            | Snare                                       | N/A               | N/A                                                    | N/A       |
| 53702     | 12   |                | I W Bridge Bal, Fine DAC Value              | Counts            | 1907 \$                                                | N/A       |
| 53904     | 12   | N/A            | Share                                       | N/A               | Ν/Δ                                                    | N/A       |
| 52004     | 4    | BBDGSI S       | Pridao Pol Space Look Start                 | Sample            | 11//5                                                  |           |
| 53000     | 10   | DRUGOLO<br>N/A | Diluge Dal. Space Look Start                | Sample            | Ν/Α                                                    | IN/A      |
| 53010     | 0    |                | Spare<br>Dridge Bel Space Look End          | IN/A              | IN/A                                                   | N/A       |
| 53824     | 10   | BRUGSLE        | впаде ваі. Space Look End                   | Sample            |                                                        | N/A       |
| 53834     | 6    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53840     | 10   | BRDGUSN        | Bridge Bal. DAC Update Sample Number        | Sample            |                                                        | N/A       |
| 53850     | 6    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53856     | 12   | BRDGWINH       | Bridge Bal. Window High                     | Counts            |                                                        | N/A       |
| 53868     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53872     | 12   | BRDGWINL       | Bridge Bal. Window Low                      | Counts            |                                                        | N/A       |
| 53884     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53888     | 12   | BRDGWINS       | Bridge Bal. Window Set Point                | Counts            |                                                        | N/A       |
| 53900     | 4    | N/A            | Spare                                       | N/A               | N/A                                                    | N/A       |
| 53904     | 12   | TSTPTT         | Total Detector Temp. Setpoint               | Counts            |                                                        | N/A       |
| 00001     |      |                |                                             | 000000            |                                                        |           |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                         | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|-------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
|           |             |               |                                     | 0                          | Temperature Control Off                                                    | _         |
| 53916     | 1           | TOTTCTRL      | Total Detector Temp. Control Status | 1                          | Temperature Control On                                                     | В         |
| 53917     | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| 53920     | 12          | SWSTPTT       | SW Detector Temp. Setpoint          | Counts                     |                                                                            | N/A       |
|           |             | 011/2022      |                                     | 0                          | Temperature Control Off                                                    |           |
| 53932     | 1           | SWICIRL       | SW Detector Temp. Control Status    | 1                          | I emperature Control On                                                    | В         |
| 53933     | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| 53936     | 12          | LWSIPII       | LW Detector Temp. Setpoint          | Counts                     | T ( 0 ( ) 0 (                                                              | N/A       |
|           |             |               |                                     | 0                          | Temperature Control Off                                                    |           |
| 53948     | 1           | LWICIRL       | LW Detector Temp. Control Status    | 1                          | Temperature Control On                                                     | В         |
| 53949     | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| 53952     | 12          | BBSETT        | Blackbody Temp. Setpoint            | Counts                     | Township Orabilor                                                          | N/A       |
|           |             | PROTEI        |                                     | 0                          | Temperature Control Off                                                    |           |
| 53964     | 1           | BBCTRL        | Blackbody Temp. Control             | 1                          | I emperature Control On                                                    | В         |
| 53965     | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
|           |             |               |                                     | 0                          | SWICS Lamp Off                                                             |           |
|           |             |               |                                     | 1                          | SWICS Lamp @ Level 1                                                       |           |
|           |             |               | A                                   | 2                          | SWICS Lamp @ Level 2                                                       |           |
| 53968     | 2           | SWICSI        | SWICS Intensity Level               | 3                          | SWICS Lamp @ Level 3                                                       | В         |
| 53970     | 30          | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
|           |             |               |                                     | 0                          | Stow                                                                       |           |
|           |             |               |                                     | 1                          | Normal Earth Scan                                                          |           |
|           |             |               |                                     | 2                          | Short Earth Scan                                                           |           |
|           |             |               |                                     | 2                          | MAM Seen                                                                   |           |
|           |             |               |                                     | 3                          | MAW Scan                                                                   |           |
|           |             |               |                                     | 4                          | Nadir Scan                                                                 |           |
|           |             |               |                                     | 5                          | Noise Test 1                                                               |           |
|           |             |               |                                     | 6                          | Noise Test 2                                                               |           |
|           |             |               |                                     | 7                          | Cal Mode 5                                                                 |           |
|           |             |               |                                     | 8                          | Cal Mode 6A                                                                |           |
|           |             |               |                                     | 9                          | Cal Mode 6B                                                                |           |
|           |             |               |                                     | 10                         | Cal Mode 7                                                                 |           |
|           |             |               |                                     | 11                         | Cal Mode 8A                                                                |           |
|           |             |               |                                     | 12                         | Cal Mode 8B                                                                |           |
|           |             |               |                                     | 13                         | Cal Mode 11                                                                |           |
|           |             |               |                                     | 14                         | Cal Mode 11                                                                |           |
|           |             |               |                                     | 15                         | Cal Mode 12                                                                |           |
| 54000     | -           | FLOCAN        | Elevering Open Made                 | 10                         |                                                                            |           |
| 54000     | 5           | ELSCAN        | Elevation Scan Mode                 | 16-31                      | Not Available                                                              | В         |
|           |             |               |                                     | 0                          | Stow                                                                       |           |
|           |             |               |                                     | 1 1                        | Normal Earth Scan                                                          |           |
|           |             |               |                                     | 2                          | Short Earth Scan                                                           |           |
|           |             |               |                                     | 3                          | MAM Scan                                                                   |           |
|           |             |               |                                     | Ă                          | Nadir Scan                                                                 |           |
|           |             |               |                                     |                            | Noise Test 1                                                               |           |
|           |             |               |                                     | 6                          | Noise Test 1                                                               |           |
|           |             |               |                                     | 7                          |                                                                            |           |
|           |             |               |                                     |                            |                                                                            |           |
|           |             |               |                                     | 8                          | Cal Mode 6A                                                                |           |
|           |             |               |                                     | 9                          | Cal Mode 6B                                                                |           |
|           |             |               |                                     | 10                         | Cal Mode 7                                                                 |           |
|           |             |               |                                     | 11                         | Cal Mode 8A                                                                |           |
|           |             |               |                                     | 12                         | Cal Mode 8B                                                                |           |
|           |             |               |                                     | 13                         | Cal Mode 11                                                                |           |
|           |             |               |                                     | 14                         | Cal Mode 12                                                                |           |
|           |             |               |                                     | 15                         | Cal Mode 14                                                                |           |
| 54005     | 5           | DECKELEV      | Elevation On-Deck Scan Mode         | 16-31                      | Not Available                                                              | в         |

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

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| State Value     State Value       0     Nominal Scan O       1     Initialization In-P       2     Elevation @ Initialization In-P       3     Scan Abort In-Pi       54010     3       54010     3       ELEVSTAT     Elevation Status       54013     1       1     Elevation Motor Drive Status       1     Drive Disable       54013     1       1     Elevation Motor Drive Status       0     Low Encoder LED | e peration cogress ad Position ogress d Position d Position ed ed B Intensity Intensity B Balled ed B                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 54010     3     ELEVSTAT     Elevation Status     0     Nominal Scan O       54011     1     Initialization In-P       54012     2     Elevation @ Initialization In-P       54013     1     Elevation Status       54014     1     Drive Disabi       54015     1     Drive Enabi                                                                                                                                  | eration<br>ogress<br>od Position<br>ogress<br>d Position<br>B<br>ed<br>B<br>Intensity<br>Intensity<br>B<br>alled<br>ed<br>B                                                           |
| 54010     3     ELEVSTAT     Elevation Motor Drive Status     1     Initialization In-P       54013     1     ELEVSTAT     Elevation Q Initialization Motor Drive Status       54013     1     ELMDRV     0       54014     0     Drive Enable       54015     1     Drive Enable                                                                                                                                   | rogress<br>ed Position<br>ogress<br>d Position<br>ed<br>ed<br>Intensity<br>Intensity<br>ed<br>ed<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B<br>B |
| 54010     3     ELEVSTAT     Elevation Q Initializ       54010     3     ELEVSTAT     2       54010     3     ELEVSTAT     Elevation Q Aborte       54011     1     Elevation Q Initializ     3       54013     1     ELMDRV     Elevation Motor Drive Status     1       6     0     Low Encoder LED                                                                                                               | ed Position ggress d Position B ed ed Ed Intensity Intensity Ed                                                                                   |
| 54010     3     ELEVSTAT     Elevation Status     3     Scan Abort In-P       54010     3     ELEVSTAT     Elevation Status     5-7     Not Used       54013     1     ELMDRV     Elevation Motor Drive Status     0     Drive Disab       54013     1     ELMDRV     Elevation Motor Drive Status     1     Drive Disab       54013     1     Elevation Motor Drive Status     1     Drive Crabel                  | ogress<br>d Position B<br>ed B<br>Intensity Intensity B<br>alled B<br>ed B                                                                                                            |
| 54010     3     ELEVSTAT     Elevation Status     4     Elevation @ Aborte       54013     1     ELMDRV     Elevation Motor Drive Status     0     Drive Disab       1     1     Elevation Motor Drive Status     1     Drive Insab       0     0     Low Encoder LED                                                                                                                                               | d Position B<br>ed B<br>Intensity Intensity B<br>alled B<br>ed B                                                                                                                      |
| 54010     3     ELEVSTAT     Elevation Status     5-7     Not Usec       54013     1     ELMDRV     0     Drive Disab       54014     1     Drive Enable     0       54015     0     Low Encoder LED                                                                                                                                                                                                                | ed B<br>Intensity B<br>alled B<br>ed B                                                                                                                                                |
| 54013         1         ELMDRV         Elevation Motor Drive Status         0         Drive Disab           54013         1         ELMDRV         Elevation Motor Drive Status         1         Drive Disab                                                                                                                                                                                                       | ed B<br>ed B<br>Intensity B<br>Intensity B<br>alled B<br>ed B                                                                                                                         |
| 54013     1     Elevation Motor Drive Status     1     Drive Enable       0     Low Encoder LED                                                                                                                                                                                                                                                                                                                     | ed B<br>Intensity B<br>alled B<br>ed B                                                                                                                                                |
| 0 Low Encoder LED                                                                                                                                                                                                                                                                                                                                                                                                   | Intensity B<br>alled ed B                                                                                                                                                             |
|                                                                                                                                                                                                                                                                                                                                                                                                                     | alled B                                                                                                                                                                               |
| 54014 1 ELEVLED Elevation Encoder LED Level 1 High Encoder LED                                                                                                                                                                                                                                                                                                                                                      | alled<br>ed B                                                                                                                                                                         |
| U Gimbal Not St                                                                                                                                                                                                                                                                                                                                                                                                     | ed B                                                                                                                                                                                  |
| S4015 1 ELSTALL Elevation Stall indicator 1 Gimbal Stall                                                                                                                                                                                                                                                                                                                                                            | NI/A                                                                                                                                                                                  |
| 34016 16 ELPOPPO Elevation Unset Correction deg                                                                                                                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                   |
| 34032 10 ELSTERR Elevation Statistical Count Transplad                                                                                                                                                                                                                                                                                                                                                              | N/A                                                                                                                                                                                   |
| SHORE 6 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 04000 0 N/A Opation Error #1 Counte                                                                                                                                                                                                                                                                                                                                                                                 | N/A                                                                                                                                                                                   |
| Order         OF         Election Fostion From#1         Output           54080         16         Election Fostion From#2         Counts                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| Group Internation         Elevention         Dotation         Dotation           54096         16         Elevention         Elevention         Elevention                                                                                                                                                                                                                                                          | N/A                                                                                                                                                                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                     | 1073                                                                                                                                                                                  |
|                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                       |
|                                                                                                                                                                                                                                                                                                                                                                                                                     | da Orașa                                                                                                                                                                              |
| 4 Fixed Step Towar                                                                                                                                                                                                                                                                                                                                                                                                  | us Open                                                                                                                                                                               |
| 5 Pixed Step Toward                                                                                                                                                                                                                                                                                                                                                                                                 | is Closed                                                                                                                                                                             |
| 54112 4 MAINCCMD Main Cover Command 6-15 Not Used                                                                                                                                                                                                                                                                                                                                                                   | В                                                                                                                                                                                     |
| U Cover Stop                                                                                                                                                                                                                                                                                                                                                                                                        | ed                                                                                                                                                                                    |
| 1 Cover Open                                                                                                                                                                                                                                                                                                                                                                                                        | ing                                                                                                                                                                                   |
| 2 Cover Closi                                                                                                                                                                                                                                                                                                                                                                                                       | ng                                                                                                                                                                                    |
| 3 Not Used                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                       |
| 4 Cover Stepping                                                                                                                                                                                                                                                                                                                                                                                                    | orward                                                                                                                                                                                |
| 5 Cover Stepping P                                                                                                                                                                                                                                                                                                                                                                                                  | Reverse                                                                                                                                                                               |
| 6-14 Not Used                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                       |
| 54116   4   MAINCOVM   Main Cover Motion Status   15   Cover Start Motion                                                                                                                                                                                                                                                                                                                                           | oving B                                                                                                                                                                               |
| 0 Not @ Opened or                                                                                                                                                                                                                                                                                                                                                                                                   | Closed                                                                                                                                                                                |
| 1 @Open                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                       |
| 2 @Closed                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                       |
| 3 Not Used                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                       |
| 4 Potential Bad S                                                                                                                                                                                                                                                                                                                                                                                                   | ensor                                                                                                                                                                                 |
| 54120         4         MAINPSTAT         Main Cover Position Status         5-15         Not Used                                                                                                                                                                                                                                                                                                                  | В                                                                                                                                                                                     |
| 0 Cover Sensor 1                                                                                                                                                                                                                                                                                                                                                                                                    | Active                                                                                                                                                                                |
| 1 Cover Sensor 2                                                                                                                                                                                                                                                                                                                                                                                                    | Active                                                                                                                                                                                |
| 54124         2         MAINACTS         Annu Cover Active Position Sensor         2-3         Not Used                                                                                                                                                                                                                                                                                                             | В                                                                                                                                                                                     |
| 54126 2 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 54128   12   MAINCMDP   Main Cover Commanded Position   Counts                                                                                                                                                                                                                                                                                                                                                      | N/A                                                                                                                                                                                   |
| 54140 4 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 54144 8 MAINLAG1 Main Cover Sensor 1 Accumulated Lag Counts                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                   |
| 54152 8 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 54160 8 MAINLAG2 Main Cover Sensor 2 Accumulated Lag Counts                                                                                                                                                                                                                                                                                                                                                         | N/A                                                                                                                                                                                   |
| 54168         8         N/A         Spare         N/A         N/A                                                                                                                                                                                                                                                                                                                                                   | N/A                                                                                                                                                                                   |
| 54176 16 MAINSTEPC Main Cover Step Count Counts                                                                                                                                                                                                                                                                                                                                                                     | N/A                                                                                                                                                                                   |
| 54192         12         MAINCLOS         Main Cover Closed Position Definition         Counts                                                                                                                                                                                                                                                                                                                      | N/A                                                                                                                                                                                   |
| 54204 4 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 54208         12         MAINOPEN         Main Cover Open Position Definition         Counts                                                                                                                                                                                                                                                                                                                        | N/A                                                                                                                                                                                   |
| 54220 4 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |
| 54224         12         MAINCMAR         Main Cover Closed Margin Definition         Counts                                                                                                                                                                                                                                                                                                                        | N/A                                                                                                                                                                                   |
| 54236 4 N/A Spare N/A N/A                                                                                                                                                                                                                                                                                                                                                                                           | N/A                                                                                                                                                                                   |

|           | Bit  | Manager       | Development                            | Units                              | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                      | DALET     |
|-----------|------|---------------|----------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|-----------|
| Start Bit | Size | Mnemonic Name | Description                            | OR<br>State Value                  | State Name                                                                                                                  | Data Type |
| 54240     | 12   | MAINOMAR      | Main Cover Open Margin Definition      | Counts                             |                                                                                                                             | N/A       |
| 54252     | 4    | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54256     | 4    | MAMCCMD       | MAM Cover Command                      | 0<br>1<br>2<br>3<br>4<br>5<br>6-15 | Stop<br>Open<br>Close<br>Not Used<br>Fixed Step Towards Open<br>Fixed Step Towards Closed<br>Not Used                       | В         |
| 5 4 2 0 0 |      | Mancova       |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6-14 | Cover Stopped<br>Cover Opening<br>Cover Closing<br>Not Used<br>Cover Stepping Forward<br>Cover Stepping Reverse<br>Not Used | R         |
| 54260     | 4    | MAMCOVM       | MAM Cover Motion Status                | 15                                 | Cover Start Moving                                                                                                          | В         |
| 54264     | 4    | MAMDSTAT      | MAM Cayor Position Status              | 0<br>1<br>2<br>3<br>4<br>5 15      | Opene or Closed     @ Open     @ Closed     Not Used     Not Used     Potential Bad Sensor     Not Used                     | В         |
| 54264     | 4    | MAMPSTAT      | WAW COVER POSICION Status              | 5-15                               |                                                                                                                             | D         |
| 54268     | 2    | MAMACTS       | MAM Cover Active Position Sensor       | 0<br>1<br>2-3                      | Cover Sensor 1 Active<br>Cover Sensor 2 Active<br>Not Used                                                                  | в         |
| 54270     | 2    | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54272     | 12   | MAMCMDP       | MAM Cover Commanded Position           | Counts                             |                                                                                                                             | N/A       |
| 54284     | 36   | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54320     | 16   | MAMSTEPC      | MAM Cover Step Count                   | Counts                             |                                                                                                                             | N/A       |
| 54336     | 12   | MAMCLOS       | MAM Cover Closed Position Definition   | Counts                             |                                                                                                                             | N/A       |
| 54348     | 4    | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54352     | 12   | MAMOPEN       | MAM Cover Open Position Definition     | Counts                             |                                                                                                                             | N/A       |
| 54364     | 4    | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54368     | 12   | MAMCMAR       | MAM Cover Closed Margin Definition     | Counts                             | 1.001                                                                                                                       | N/A       |
| 54380     | 4    | N/A           | Snare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54384     | 12   | MAMOMAR       | MAM Cover Open Margin Definition       | Counts                             | 1073                                                                                                                        | N/A       |
| 54396     | 4    | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 04000     | -    | 1071          | oparo                                  | 0                                  | Pecet Not bec W/D Timeout                                                                                                   | 14/7 (    |
| 54400     | 1    | DWDGBOOT      | DAP Processor Boot Status              | 1                                  | Reset her, Watchdog Timeout                                                                                                 |           |
| 54400     | 1    | DWDGENBL      | DAP Processor Watchdog Enable Status   | 0                                  | Disarm Watchdog Timer<br>Arm Watchdog Timer                                                                                 | В         |
|           |      |               |                                        | 0                                  | PROM Power On                                                                                                               |           |
| 54402     | 1    | DPROMPWR      | DAP Processor PROM Power Status        | 1                                  | PROM Power Off                                                                                                              | В         |
| 54403     | 2    |               | DAP Sample Clock Interrupt Occurred    | N/A                                | N/A                                                                                                                         | N/A       |
| 54405     | 11   | N/A           | Spare                                  | N/A                                | N/A                                                                                                                         | N/A       |
| 54416     | 16   | DSCANPER      | DAP Processor Scan Period Count        | Counts                             |                                                                                                                             | N/A       |
| 54432     | 16   | DMEMSOFF      | DAP Mem Dump Start Address Offset      | Offset                             |                                                                                                                             | N/A       |
| 54448     | 16   | DMEMSSEG      | DAP Mem Dump Start Address Segment     | Segment                            |                                                                                                                             | N/A       |
| 54464     | 16   | DMEMEOFF      | DAP Mem Dump End Address Offset        | Offset                             |                                                                                                                             | N/A       |
| 54480     | 16   | DMEMESEG      | DAP Mem Dump End Address Segment       | Segment                            |                                                                                                                             | N/A       |
| 54496     | 16   | DPCKSOFF      | DAP Mem Dump Pckt Start Address Offset | Offset                             |                                                                                                                             | N/A       |
| 54512     | 16   | DPCKSSEG      | DAP Mem Dump Pokt Start Address Seg    | Segment                            |                                                                                                                             | N/A       |
| 54528     | 16   |               | DAP Mem Dump Address Changed           | N/A                                | N/A                                                                                                                         | N/A       |
| 34020     | 10   |               | Brit Mont Burnp Address Shangod        | 1.07                               | 1 1973                                                                                                                      |           |

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| Start Bit | Bit<br>Size | Mnemonic Name | Description                      | Units<br>OR<br>State Value                                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                  | Data Type |
|-----------|-------------|---------------|----------------------------------|---------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 54544     | 16          | DPMINET       | DAP Min Execution Time           | msec                                                          |                                                                                                                                                                                                                                                             | N/A       |
| 54560     | 11          | DPMINESN      | DAP Min Execution Sample Number  | Counts                                                        |                                                                                                                                                                                                                                                             | N/A       |
| 54571     | 5           | N/A           | Spare                            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
| 54576     | 16          | DPMAXET       | DAP Max Execution Time           | msec                                                          |                                                                                                                                                                                                                                                             | N/A       |
| 54592     | 11          | DPMAXESN      | DAP Max Execution Sample Number  | Counts                                                        |                                                                                                                                                                                                                                                             | N/A       |
| 54603     | 5           | N/A           | Spare                            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
| 54608     | 16          | DCODCKSUM     | DAP RAM Code Checksum            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
| 54624     | 16          | DROMCKSUM     | DAP ROM Checksum                 | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
| 54640     | 80          | N/A           | Spare                            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
|           |             |               |                                  | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11-15 | Go to Crosstrack<br>Go to Position A<br>Go to Position B<br>Go to Solar Calibration Angle<br>Go to Spare Position 1<br>Go to Spare Position 1<br>Go to Spare Position 3<br>Scan A to B Asynchronous<br>Scan A to B Asynchronous<br>Stop Azimuth<br>Not Used |           |
| 54720     | 5           | AZMODE        | Azimuth Mode                     | 16-31                                                         | Not Available                                                                                                                                                                                                                                               | В         |
| E 4705    |             | A 7040T       | Animuth Mating Status            | 0                                                             | Stopped                                                                                                                                                                                                                                                     |           |
| 54725     | 1           | AZMUT         | Azimuth Motion Status            | 1                                                             | Moving                                                                                                                                                                                                                                                      | В         |
| 5 4700    |             | 4 7 D I D     | Animouth Dispetien Obsture       | 0                                                             | Forward                                                                                                                                                                                                                                                     |           |
| 54726     | 1           | AZDIR         | Azimuth Direction Status         | 1                                                             | Reverse                                                                                                                                                                                                                                                     | в         |
|           |             |               |                                  | 1<br>2<br>3<br>4                                              | At Stopped<br>At Initial Position<br>At Scan Position<br>In Motion                                                                                                                                                                                          |           |
| 54727     | 4           | AZPOSSTAT     | Azimuth Position Status          | 5-15                                                          | Not Used                                                                                                                                                                                                                                                    | В         |
|           |             |               |                                  | 0                                                             | Drive Disabled                                                                                                                                                                                                                                              |           |
| 54731     | 1           | AZMDRV        | Azimuth Motor Drive Status       | 1                                                             | Drive Enabled                                                                                                                                                                                                                                               | В         |
| 54732     | 1           | AZLED         | Azimuth Encoder LED Level        | 0                                                             | Low Encoder LED Intensity<br>High Encoder LED Intensity                                                                                                                                                                                                     | в         |
|           |             |               |                                  | 0                                                             | Gimbal Not Stalled                                                                                                                                                                                                                                          |           |
| 54733     | 1           | AZSTALL       | Azimuth Stall Indicator          | 1                                                             | Gimbal Stalled                                                                                                                                                                                                                                              | В         |
| 54734     | 2           | N/A           | Spare                            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
| 54736     | 16          | AZFIX0        | Crosstrack Position Definition   | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54752     | 16          | AZFIX1        | Position A Definition            | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54768     | 16          | AZFIX2        | Position B Definition            | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54784     | 16          | AZFIX3        | Solar Cal. Position Definition   | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54800     | 16          | AZFIX4        | Az Cage Position Definition      | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54816     | 16          | AZFIX5        | Spare Az Position Definition #1  | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54832     | 16          | AZFIX6        | Spare Az Position Definition #2  | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54848     | 16          | AZFIX7        | Spare Az Position Definition #3  | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54864     | 16          | AZRATE0       | Normal (GOTO) AZ Rate Definition | deg/sec                                                       |                                                                                                                                                                                                                                                             | N/A       |
| 54880     | 16          | AZRATE1       | Unsync AZ Scan Rate Definition   | deg/sec                                                       |                                                                                                                                                                                                                                                             | N/A       |
| 54896     | 16          | AZRATE2       | Sync AZ Scan Rate Definition     | deg/sec                                                       |                                                                                                                                                                                                                                                             | N/A       |
| 54912     | 16          | AZCORR        | Azimuth Offset Correction        | deg                                                           |                                                                                                                                                                                                                                                             | N/A       |
| 54928     | 16          | AZSTERR       | Azimuth Stall Error Threshold    | Counts                                                        |                                                                                                                                                                                                                                                             | N/A       |
| 54944     | 10          | AZSTCNT       | Azimuth Stall Count Threshold    | Counts                                                        |                                                                                                                                                                                                                                                             | N/A       |
| 54954     | 6           | N/A           | Spare                            | N/A                                                           | N/A                                                                                                                                                                                                                                                         | N/A       |
|           |             |               |                                  |                                                               |                                                                                                                                                                                                                                                             |           |

### Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

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| Start Bit | Bit  | Mnemonic Name | Description                        | Units<br>OR | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR | Data Type |
|-----------|------|---------------|------------------------------------|-------------|--------------------------------------------------------------|-----------|
|           | Size |               |                                    | State Value | State Name                                                   |           |
|           |      |               |                                    | 0           | Stop                                                         |           |
|           |      |               |                                    | 1           | Cage                                                         |           |
|           |      |               |                                    | 2           | Apply                                                        |           |
|           |      |               |                                    | 3           | Release                                                      |           |
|           |      |               |                                    | 4           | Fixed Step Towards Care                                      |           |
|           |      |               |                                    | 5           | Fixed Step Towards Applied                                   |           |
| 54060     | 4    | BRAKECMD      | Brake Command Status               | 6-15        | Not Lised                                                    | в         |
| 04900     | 4    | BRAREOND      | Brake Command Status               | 0-13        | Stanged                                                      | В         |
|           |      |               |                                    | 0           | Stopped                                                      |           |
|           |      |               |                                    | 1           | Caging                                                       |           |
|           |      |               |                                    | 2           | Applying                                                     |           |
|           |      |               |                                    | 3           | Releasing                                                    |           |
|           |      |               |                                    | 4           | Forward Stepping                                             |           |
|           |      |               |                                    | 5           | Reverse Stepping                                             |           |
|           |      |               |                                    | 6-14        | Not Used                                                     |           |
| 54964     | 4    | BRAKEMOT      | Brake Motion Status                | 15          | Start Moving                                                 | В         |
|           |      |               |                                    | 0           | Not @ Relessd Appld or Caged                                 |           |
|           |      |               |                                    | 1           | @ Caned                                                      |           |
|           |      |               |                                    | 2           | @ Applied                                                    |           |
|           |      |               |                                    | 2           | Released                                                     |           |
|           |      |               |                                    | 3           | Celeaseu                                                     |           |
|           |      |               |                                    | 4           | Potential Bad Position Sensor                                |           |
| 54968     | 4    | BRAKEPOS      | Brake Position Status              | 5-15        | Not Used                                                     | В         |
| 54972     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 54976     | 12   | BRKCMDPS      | Brake Commanded Position           | Counts      |                                                              | N/A       |
| 54988     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 54992     | 12   | BRKCURPS      | Brake Current Position             | Counts      | k1/A                                                         | N/A       |
| 55004     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55008     | 8    | BRKPSMUX      | Brake Position Submux Channel      | N/A         | N/A                                                          | N/A       |
| 55016     | 8    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55024     | 16   | BRKSCNI       | Brake Step Count                   | Counts      |                                                              | N/A       |
| 55040     | 12   | BRKRELEA      | Brake Released Position Definition | Counts      | k1/A                                                         | N/A       |
| 55052     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55056     | 12   | BRKAPPLY      | Brake Applied Position Definition  | Counts      |                                                              | N/A       |
| 55068     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55072     | 12   | BRKCAGED      | Brake Caged Position Definition    | Counts      |                                                              | N/A       |
| 55084     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55088     | 12   | BRKRMAR       | Brake Released Margin              | Counts      |                                                              | N/A       |
| 55100     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55104     | 12   | BRKAMAR       | Brake Applied Margin               | Counts      |                                                              | N/A       |
| 55116     | 4    | N/A           | Spare<br>Date Grand Marrie         | N/A         | N/A                                                          | N/A       |
| 55120     | 12   | BRKCMAR       | Brake Caged Margin                 | Counts      |                                                              | N/A       |
| 55132     | 4    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
| 55136     | 16   | AZPERR        | Azimuth Position Error             | Counts      |                                                              | N/A       |
| 55152     | 5    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
|           |      |               |                                    | 0           | Bus A Selected                                               |           |
| 55157     | 1    | TMFBUS        | Time Mark & Frequency Bus Select   | 1           | Bus B Selected                                               | В         |
|           |      |               |                                    | 0           | No Time Mark & Freq Interrupt                                |           |
| 55158     | 1    | TMFINT        | Time Mark & Frequency Interrupt    | 1           | TM & Freq Interrupt Occurred                                 | В         |
|           |      |               |                                    |             |                                                              |           |
| 55159     | 9    | N/A           | Spare                              | N/A         | N/A                                                          | N/A       |
|           |      |               |                                    |             |                                                              |           |
|           |      |               |                                    |             |                                                              |           |

### Table 4.5.3 CERES Science Data Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type  |
|-----------|-------------|---------------|--------------------------------------|----------------------------|----------------------------------------------------------------------------|------------|
| 55400     | ,           | INFORMAT      |                                      | 0                          | Reset Not bec. W/D Timeout                                                 | _          |
| 55168     | 1           | IWDGBOOT      | ICP Processor Boot Status            | 1                          | Reset bec. Watchdog Timeout                                                | В          |
| 55160     | 1           | IMDGENBI      | ICP Processor Watchdog Enable Status | 1                          | Arm Watchdog Timer                                                         | ь          |
| 55169     |             | IWDGEINBL     |                                      | 0                          | PROM Power On                                                              | B          |
| 55170     | 1           |               | ICP Processor PROM Power Status      | 1                          | PROM Power Off                                                             | в          |
| 55171     | 2           |               | ICP Sample Clock Interrupt Occurred  | N/A                        | N/A                                                                        | N/A        |
| 00171     | -           |               |                                      | 0                          | DMA Communication OK                                                       | 10// (     |
|           |             |               |                                      | 1                          | DMA Transmit Timed Out                                                     |            |
|           |             |               |                                      | 2                          | DMA Receive Timed Out                                                      |            |
|           |             |               |                                      | 3                          | Sample Numbers Out of Sync                                                 |            |
| 55173     | 3           | COMMSTAT      | DMA Communication Status             | 4-7                        | Not Used (TRMM only)                                                       | В          |
| 55176     | 8           | N/A           | Spare                                | N/A                        | N/A                                                                        | N/A        |
| 55184     | 16          | ISCANPER      | ICP Processor Scan Period Count      | Counts                     |                                                                            | N/A        |
| 55200     | 16          | IMEMSOFF      | ICP Mem Dump Start Address Offset    | Offset                     |                                                                            | N/A        |
| 55216     | 16          | IMEMSSEG      | ICP Mem Dump Start Address Segment   | Segment                    |                                                                            | N/A        |
| 55232     | 16          | IMEMEOFF      | ICP Mem Dump End Address Offset      | Offset                     |                                                                            | N/A        |
| 55248     | 16          | INENESEG      | ICP Mem Dump End Address Segment     | Offect                     |                                                                            | N/A        |
| 55280     | 16          | IPCKSOFF      | ICP Mem Dump Pokt Start Address Seg  | Segment                    |                                                                            | N/A<br>N/A |
| 55296     | 10          | IF CROOLD     | ICP Mem Dump Address Changed         | N/A                        | Ν/Δ                                                                        | N/A        |
| 55312     | 16          | IPMINET       |                                      | msec                       |                                                                            | N/A        |
| 55328     | 11          | IPMINESN      | ICP Min Execution Sample Number      | Counts                     |                                                                            | N/A        |
| 55339     | 5           | N/A           | Spare                                | N/A                        | N/A                                                                        | N/A        |
| 55344     | 16          | IPMAXET       | ICP Max Execution Time               | msec                       |                                                                            | N/A        |
| 55360     | 11          | IPMAXESN      | ICP Max Execution Sample Number      | Counts                     |                                                                            | N/A        |
| 55371     | 5           | N/A           | Spare                                | N/A                        | N/A                                                                        | N/A        |
| 55376     | 16          | ICODCKSUM     | ICP RAM Code Checksum                | N/A                        | N/A                                                                        | N/A        |
| 55392     | 16          | IROMCKSUM     | ICP ROM Checksum                     | N/A                        | N/A                                                                        | N/A        |
| 55408     | 80          | N/A           | Spare                                | N/A                        | N/A                                                                        | N/A        |
| 55400     |             | CDC1CTAT      | CDC 4 Cup Dessente Chate             | 0                          | Sun is Not Present                                                         | Б          |
| 55488     | 1           | SPSISIAI      | SPS 1 Sun Presence State             | 1                          | Sun is Present                                                             | В          |
| 55400     | 4           | CDCCCTAT      | CDC 2 Cup Broospec State             | 1                          | Sun is Not Present                                                         | Б          |
| 00409     | 1           | 3F3231A1      | 3F3 2 Sull Flesence State            | 0                          | Solar Pres Response Disabled                                               | В          |
| 55490     | 1           | SPS1RESP      | SPS 1 Sun Presence Response          | 1                          | Solar Pres Response Enabled                                                | в          |
| 00400     |             | GIGINEO       |                                      | 0                          | Solar Pres Response Disabled                                               | 0          |
| 55491     | 1           | SPS2RESP      | SPS 2 Sun Presence Response          | 1                          | Solar Pres Response Enabled                                                | в          |
|           |             |               |                                      | 0                          | Solar Warning Not Issued                                                   | _          |
|           |             |               |                                      | 1                          | Solar Warning Issued                                                       |            |
| 55492     | 2           | SOLWARN       | Solar Warning Status                 | 2-3                        | Unused                                                                     | В          |
|           |             |               |                                      | 0                          | Scan T/O Response Disabled                                                 |            |
| 55494     | 1           | STOUTRSP      | Scan Timeout Response                | 1                          | Scan T/O Response Enabled                                                  | В          |
|           |             |               |                                      | 0                          | Scan T/O Not Actively Counting                                             |            |
|           |             |               |                                      | 1                          | Scan T/O Actively Counting                                                 |            |
| 55495     | 2           | STOUTAC       | Scan Timeout Actively Counting       | 2-3                        | Unused                                                                     | В          |
|           |             |               |                                      | 0                          | No Scan Timeout                                                            |            |
|           |             |               |                                      | 1                          | Scan Timeout Occurred                                                      |            |
| 55497     | 2           | STOUTOCC      | Scan Timeout Occurred                | 2-3                        | Unused                                                                     | В          |
| 55499     | 5           | N/A           | Spare                                | N/A                        | N/A                                                                        | N/A        |
| 55504     | 16          | SWRNSMPL      | Solar Warning Event Sample           | Counts                     |                                                                            | N/A        |
| 55520     | 16          | SWRNSCAN      | Solar Warning Event Scan Period      | Counts                     |                                                                            | N/A        |
| 00000     | 10          | 31001301      |                                      | Counts                     | 1                                                                          | IN/A       |
|           |             |               |                                      |                            |                                                                            |            |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type  |
|-----------|-------------|---------------|-------------------------------------------|----------------------------|----------------------------------------------------------------------------|------------|
| 55552     | 12          | SPSS1         | SPS 1 Narrow (Signal) Output              | Counts                     |                                                                            | N/A        |
| 55564     | 4           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55568     | 12          | SPST1         | SPS 1 Wide (Threshold) Output             | Counts                     |                                                                            | N/A        |
| 55580     | 4           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55584     | 12          | SPSTINO       | SPS 1 Noise Threshold                     | Counts                     | 11/4                                                                       | N/A        |
| 55596     | 4           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55600     | 6           | SPSTINUM      | SPS 1 Ratio Threshold                     | Counts                     | 1//4                                                                       | N/A        |
| 55606     | 10          | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
|           |             | 00010570      |                                           | 0                          | Sun Not Detected                                                           |            |
| 55616     | 1           | SPSIDETS      | SPS 1 Solar Detection State               | 1                          | Sun Detected                                                               | В          |
| 55617     | 15          | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55632     | 10          | SPSIDEIC      | SPS 1 Detection Count                     | Counts                     | A1/A                                                                       | N/A        |
| 55642     | 6           | N/A           | Spare<br>OPO 4 Oswat Thatshald            | N/A                        | N/A                                                                        | N/A        |
| 55648     | 10          | SPSICNII      | SPS 1 Count Inreshold                     | Counts                     | N/A                                                                        | N/A        |
| 55658     | 6           | N/A           | Spare<br>CBS 1 May Dat Caunt During Coort | N/A                        | N/A                                                                        | N/A        |
| 55664     | 10          | SPSTMAAC      | SPS T Max Det Count During Scan           | Counts                     | N/A                                                                        | N/A        |
| 55674     | 10          | N/A<br>SDSS2  | SPS 2 Norrow (Signal) Output              | N/A<br>Counto              | N/A                                                                        | N/A        |
| 55600     | 12          | 5F 552        | SP3 2 Nallow (Signal) Output              | Counts<br>N/A              | N/A                                                                        | N/A<br>N/A |
| 55606     | 4           |               | SPS 2 Wide (Threshold) Output             | Counte                     | N/A                                                                        | N/A        |
| 55709     | 12          | 0F012         | Share                                     | N/A                        | N/A                                                                        | N/A        |
| 55712     | 4           |               | SPS 2 Noise Threshold                     | Counts                     | N/A                                                                        | N/A        |
| 55724     | 4           | N/A           | Share                                     | N/A                        | N/A                                                                        | N/A        |
| 55728     | 6           | SPS2TNUM      | SPS 2 Ratio Threshold                     | Counts                     |                                                                            | N/A        |
| 55734     | 10          | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 00104     | 10          | 107           | opulo                                     | 0                          | Sun Not Detected                                                           | 1.071      |
| 55744     | 1           | SPS2DETS      | SPS 2 Solar Detection State               | 1                          | Sun Detected                                                               | в          |
| 55745     | 15          | N/A           | Share                                     | N/A                        | N/A                                                                        | N/A        |
| 55760     | 10          | SPS2DETC      | SPS 2 Detection Count                     | Counts                     | 10/1                                                                       | N/A        |
| 55770     | 6           | N/A           | Share                                     | N/A                        | N/A                                                                        | N/A        |
| 55776     | 10          | SPS2CNTT      | SPS 2 Count Threshold                     | Counts                     |                                                                            | N/A        |
| 55786     | 6           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55792     | 10          | SPS2MAXC      | SPS 2 Max Det Count During Scan           | Counts                     |                                                                            | N/A        |
| 55802     | 6           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55808     | 10          | SCNTINIT      | Scan Count Initial                        | Counts                     |                                                                            | N/A        |
| 55818     | 6           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
| 55824     | 10          | SCNTCRNT      | Scan Count Current                        | Counts                     |                                                                            | N/A        |
| 55834     | 6           | N/A           | Spare                                     | N/A                        | N/A                                                                        | N/A        |
|           |             |               | ATT CHOILD BY                             |                            |                                                                            |            |
|           |             |               |                                           |                            |                                                                            |            |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |         |                                                                  | State value | State Name |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------------------------------------------------------------------|-------------|------------|-----|
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SPSS1   | Engineering Data sample 0, SPS 1 Narrow Output                   | Counts      |            | N/A |
| $\begin{array}{cccc} 240 & 12\\ 320 & 12\\ 400 & 12\\ 480 & 12\\ 560 & 12\\ 640 & 12\\ 720 & 12\\ 880 & 12\\ 720 & 12\\ 880 & 12\\ 1040 & 12\\ 1040 & 12\\ 1120 & 12\\ 1200 & 12\\ 1280 & 12\\ 1360 & 12\\ 1440 & 12\\ 1520 & 12\\ 1680 & 12\\ 1680 & 12\\ 1680 & 12\\ 1680 & 12\\ 1760 & 12\\ 1840 & 12\\ 1920 & 12\\ 2000 & 12\\ 2000 & 12\\ 2000 & 12\\ 2080 & 12\\ \end{array}$                                                                                                                                                                                                                    | SPST1   | Engineering Data sample 1, SPS 1 Wide Output (Threshold)         | Counts      |            | N/A |
| 320         12           400         12           480         12           560         12           640         12           720         12           800         12           960         12           1040         12           1120         12           1200         12           1360         12           1440         12           1520         12           1600         12           1600         12           1640         12           1760         12           1840         12           1920         12           20000         12           20000         12           20000         12 | SPSS2   | Engineering Data sample 2, SPS 2 Narrow Output                   | Counts      |            | N/A |
| $\begin{array}{c ccccc} 400 & 12 \\ \hline 480 & 12 \\ \hline 560 & 12 \\ \hline 640 & 12 \\ \hline 720 & 12 \\ \hline 800 & 12 \\ \hline 880 & 12 \\ \hline 960 & 12 \\ \hline 1040 & 12 \\ \hline 1120 & 12 \\ \hline 1200 & 12 \\ \hline 1200 & 12 \\ \hline 1200 & 12 \\ \hline 1360 & 12 \\ \hline 1360 & 12 \\ \hline 1440 & 12 \\ \hline 1520 & 12 \\ \hline 1600 & 12 \\ \hline 1680 & 12 \\ \hline 1680 & 12 \\ \hline 1760 & 12 \\ \hline 1840 & 12 \\ \hline 1920 & 12 \\ \hline 1920 & 12 \\ \hline 2000 & 12 \\ \hline 2000 & 12 \\ \hline 2000 & 12 \\ \hline \end{array}$               | SPS12   | Engineering Data sample 3, SPS 2 Wide Output (Threshold)         | Counts      |            | N/A |
| 480         12           560         12           640         12           720         12           800         12           960         12           1040         12           1120         12           1200         12           1200         12           1360         12           1440         12           1520         12           1680         12           1760         12           1840         12           1920         12           2000         12           2000         12           2000         12                                                                                | THTOT   | Engineering Data sample 4, Total Control Temperature             | deg C       |            | N/A |
| $\begin{array}{c cccccc} 560 & 12 \\ \hline 640 & 12 \\ \hline 720 & 12 \\ \hline 800 & 12 \\ \hline 880 & 12 \\ \hline 960 & 12 \\ \hline 1040 & 12 \\ \hline 1120 & 12 \\ \hline 1200 & 12 \\ \hline 1200 & 12 \\ \hline 1360 & 12 \\ \hline 1360 & 12 \\ \hline 1440 & 12 \\ \hline 1520 & 12 \\ \hline 1600 & 12 \\ \hline 1600 & 12 \\ \hline 1680 & 12 \\ \hline 1760 & 12 \\ \hline 1840 & 12 \\ \hline 1920 & 12 \\ \hline 2000 & 12 \\ \hline 2000 & 12 \\ \hline 2000 & 12 \\ \hline \end{array}$                                                                                            | ISIOI   | Engineering Data sample 5, Total Sensor Temperature Monitor      | deg C       |            | N/A |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | THSW    | Engineering Data sample 6, SW Control Temperature                | deg C       |            | N/A |
| 720         12           800         12           960         12           1040         12           1120         12           1280         12           1200         12           1280         12           1360         12           1440         12           1520         12           1680         12           1760         12           1840         12           1920         12           2000         12           2000         12           2080         12                                                                                                                                 | TSSW    | Engineering Data sample 7, SW Sensor Temperature Monitor         | deg C       |            | N/A |
| 800         12           880         12           960         12           1040         12           1120         12           1280         12           1360         12           1440         12           1520         12           1600         12           1760         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                     | THLW    | Engineering Data sample 8, LW Control Temperature                | deg C       |            | N/A |
| 880         12           960         12           1040         12           1120         12           1200         12           1360         12           1440         12           1520         12           1600         12           1660         12           1760         12           1840         12           1920         12           20000         12           2080         12                                                                                                                                                                                                             | ISLW    | Engineering Data sample 9, LW Sensor Temperature Monitor         | deg C       |            | N/A |
| 960         12           1040         12           1120         12           1280         12           1360         12           1440         12           1520         12           1680         12           1680         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                       | EIRQ    | Engineering Data sample 10, ECA Torque Output                    | in-oz       |            | N/A |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SPSS1   | Engineering Data sample 11, SPS 1 Narrow Output                  | Counts      |            | N/A |
| 1120         12           1200         12           1280         12           1360         12           1440         12           1520         12           1600         12           1660         12           1760         12           1840         12           1920         12           20000         12           2080         12                                                                                                                                                                                                                                                               | SPS11   | Engineering Data sample 12, SPS 1 Wide Output (Threshold)        | Counts      |            | N/A |
| $\begin{array}{c ccccccccccccccccccccccccccccccccccc$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SPSS2   | Engineering Data sample 13, SPS 2 Narrow Output                  | Counts      |            | N/A |
| $\begin{array}{c ccccc} 1280 & 12 \\ \hline 1360 & 12 \\ \hline 1440 & 12 \\ \hline 1520 & 12 \\ \hline 1680 & 12 \\ \hline 1680 & 12 \\ \hline 1760 & 12 \\ \hline 1840 & 12 \\ \hline 1920 & 12 \\ \hline 2000 & 12 \\ \hline 2080 & 12 \\ \hline \end{array}$                                                                                                                                                                                                                                                                                                                                       | SPS12   | Engineering Data sample 14, SPS 2 Wide Output (Threshold)        | Counts      |            | N/A |
| $\begin{array}{c cccccc} 1360 & 12 \\ \hline 1440 & 12 \\ \hline 1520 & 12 \\ \hline 1600 & 12 \\ \hline 1600 & 12 \\ \hline 1760 & 12 \\ \hline 1760 & 12 \\ \hline 1840 & 12 \\ \hline 1920 & 12 \\ \hline 2000 & 12 \\ \hline 2080 & 12 \\ \hline \end{array}$                                                                                                                                                                                                                                                                                                                                      | HDACTOT | Engineering Data sample 15, Total Heater DAC Value               | Counts      | )          | N/A |
| 1440         12           1520         12           16600         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                 | HDACSW  | Engineering Data sample 16, SW Heater DAC Value                  | Counts      |            | N/A |
| 1520         12           1600         12           1680         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                  | HDACLW  | Engineering Data sample 17, LW Heater DAC Value                  | Counts      |            | N/A |
| 1600         12           1680         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                                            | TBBTOTM | Engineering Data sample 18, Total Blackbody Temperature          | deg C       |            | N/A |
| 1680         12           1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                                                                      | TBBLWM  | Engineering Data sample 19, LW Blackbody Temperature             | deg C       |            | N/A |
| 1760         12           1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | HDACBB  | Engineering Data sample 20, Blackbody Heater DAC Value           | Counts      |            | N/A |
| 1840         12           1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ATRQ    | Engineering Data sample 21, ACA Torque Output                    | in-oz       |            | N/A |
| 1920         12           2000         12           2080         12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | SPSS1   | Engineering Data sample 22, SPS 1 Narrow Output                  | Counts      |            | N/A |
| 2000 12<br>2080 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SPST1   | Engineering Data sample 23, SPS 1 Wide Output (Threshold)        | Counts      |            | N/A |
| 2080 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPSS2   | Engineering Data sample 24, SPS 2 Narrow Output                  | Counts      |            | N/A |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SPST2   | Engineering Data sample 25, SPS 2 Wide Output (Threshold)        | Counts      |            | N/A |
| 2160 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MCP1    | Engineering Data sample 26, Main Cover Position 1                | Counts      |            | N/A |
| 2240 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MCP2    | Engineering Data sample 27, Main Cover Position 2                | Counts      |            | N/A |
| 2320 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | MAMCP   | Engineering Data sample 28, MAM Cover Position                   | Counts      |            | N/A |
| 2400 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TMCM    | Engineering Data sample 29, Main Cover Motor Temperature         | deg C       |            | N/A |
| 2480 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TSWCS   | Engineering Data sample 30, SWICS Photodiode Temperature         | deg C       |            | N/A |
| 2560 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SWCSMON | Engineering Data sample 31, SWICS Photodiode Output              | Counts      |            | N/A |
| 2640 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | LAMPC   | Engineering Data sample 32, SWICS Lamp Current                   | mA          |            | N/A |
| 2720 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPSS1   | Engineering Data sample 33, SPS 1 Narrow Output                  | Counts      |            | N/A |
| 2800 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPST1   | Engineering Data sample 34, SPS 1 Wide Output (Threshold)        | Counts      |            | N/A |
| 2880 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPSS2   | Engineering Data sample 35, SPS 2 Narrow Output                  | Counts      |            | N/A |
| 2960 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPST2   | Engineering Data sample 36, SPS 2 Wide Output (Threshold)        | Counts      |            | N/A |
| 3040 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TSMOD   | Engineering Data sample 37, Sensor Module Temperature            | dea C       |            | N/A |
| 3120 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TESPC   | Engineering Data sample 38, Elevation Spindle Temp. (Cable Wrap) | deg C       |            | N/A |
| 3200 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TESPM   | Engineering Data sample 39, Elevation Spindle Temp. (Motor)      | deg C       |            | N/A |
| 3280 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TELBC   | Engineering Data sample 40, Elevation Bearing Temp. (Cable Wrap) | dea C       |            | N/A |
| 3360 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TELBM   | Engineering Data sample 41, Elevation Bearing Temp. (Motor)      | deg C       |            | N/A |
| 3440 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TECA    | Engineering Data sample 42. ECA Electronics Temperature          | dea C       |            | N/A |
| 3520 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TERAD   | Engineering Data sample 43, ECA Radiator Temperature             | dea C       |            | N/A |
| 3600 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPSS1   | Engineering Data sample 44, SPS 1 Narrow Output                  | Counts      |            | N/A |
| 3680 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPST1   | Engineering Data sample 45, SPS 1 Wide Output (Threshold)        | Counts      |            | N/A |
| 3760 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPSS2   | Engineering Data sample 46, SPS 2 Narrow Output                  | Counts      |            | N/A |
| 3840 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | SPST2   | Figureering Data sample 47 SPS 2 Wide Output (Threshold)         | Counts      |            | N/A |
| 3920 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TSEA    | Engineering Data sample 48 Sensor Electronics Temperature        | dea C       |            | N/A |
| 4000 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TMAMBT1 | Engineering Data sample 49 MAM Total Baffle Temperature #1       | deg C       |            | N/A |
| 4080 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TMAMBT2 | Engineering Data sample 50, MAM Total Baffle Temperature #2      | deg C       |            | N/A |
| 4160 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TMAMT   | Engineering Data - sample 51 MAM Total Assembly Temperature      | deg C       |            | N/A |
| 4240 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TMAMSW  | Engineering Data sample 51, MAM Fold Assembly Temperature        | deg C       |            | Ν/Δ |
| 1320 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TAZBII  | Engineering Data sample 52, Azimuth Linner Rearing Temperature   | deg C       |            | N/A |
| 4400 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | TALDU   | L Engineering Data sample 35, Azimuti Opper Dearing Temperature  | ueyo        |            | N/A |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | ****    | Engineering Data sample 54 unused                                | Ν/Δ         | N/A        | N/A |

| Start Bit | Bit<br>Size | Mnemonic Name  | Description                                                   | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|----------------|---------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 4480      | 12          | SPSS1          | Engineering Data sample 55, SPS 1 Narrow Output               | Counts                     |                                                                            | N/A       |
| 4560      | 12          | SPS11          | Engineering Data sample 56, SPS 1 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 4640      | 12          | SPSS2          | Engineering Data sample 57, SPS 2 Narrow Output               | Counts                     |                                                                            | N/A       |
| 4720      | 12          | SPS12          | Engineering Data sample 58, SPS 2 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 4800      | 12          | THIOT          | Engineering Data sample 59, Total Control Temperature         | deg C                      |                                                                            | N/A       |
| 4880      | 12          | ISIOI          | Engineering Data sample 60, 1 otal Sensor Temperature Monitor | deg C                      |                                                                            | N/A       |
| 4960      | 12          | THSVV          | Engineering Data sample 61, SW Control Temperature            | deg C                      |                                                                            | N/A       |
| 5040      | 12          | TSSW           | Engineering Data sample 62, SVV Sensor Temperature Monitor    | deg C                      |                                                                            | N/A       |
| 5120      | 12          | THLW           | Engineering Data sample 63, LW Control Temperature            | deg C                      |                                                                            | N/A       |
| 5200      | 12          | ISLW           | Engineering Data sample 64, LVV Sensor Temperature Monitor    | deg C                      |                                                                            | N/A       |
| 5280      | 12          | EIRQ           | Engineering Data sample 65, ECA Torque Output                 | in-oz                      |                                                                            | N/A       |
| 5360      | 12          | SPSS1          | Engineering Data sample 66, SPS 1 Narrow Output               | Counts                     |                                                                            | N/A       |
| 5440      | 12          | SPS11          | Engineering Data sample 67, SPS 1 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 5520      | 12          | 5P552          | Engineering Data sample 68, SPS 2 Narrow Output               | Counts                     |                                                                            | N/A       |
| 5600      | 12          | SPS12          | Engineering Data sample 69, SPS 2 wide Output (Inresnoid)     | Counts                     |                                                                            | N/A       |
| 5680      | 12          | HDACTOT        | Engineering Data sample 70, Total Heater DAC Value            | Counts                     |                                                                            | N/A       |
| 5760      | 12          | HDACSW         | Engineering Data sample 71, SW Heater DAC Value               | Counts                     |                                                                            | N/A       |
| 5840      | 12          | TRACLVV        | Engineering Data sample 72, LVV Heater DAC Value              | Counts                     |                                                                            | N/A       |
| 5920      | 12          |                | Engineering Data sample 73, Total Blackbody Temperature       | deg C                      |                                                                            | N/A       |
| 6000      | 12          | TBBLVVIVI      | Engineering Data sample 74, LVV Blackbody Temperature         | deg C                      |                                                                            | N/A       |
| 6080      | 12          | HDACBB         | Engineering Data sample 75, Blackbody Heater DAC Value        | Counts                     |                                                                            | N/A       |
| 0100      | 12          | AIRQ           | Engineering Data sample 76, ACA Torque Output                 | In-oz                      |                                                                            | N/A       |
| 6240      | 12          | 5P551          | Engineering Data sample 77, SPS 1 Nanow Output                | Counts                     |                                                                            | N/A       |
| 6320      | 12          | 3F311          | Engineering Data Sample 76, SPS 1 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 6400      | 12          | 5P552          | Engineering Data sample 79, SPS 2 Narrow Output               | Counts                     |                                                                            | N/A       |
| 0460      | 12          | SPS12          | Engineering Data sample ou, SPS 2 wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 0000      | 12          | ECTRKF         | Engineering Data sample 81, ECA Encoder Clear Track A         | Counts                     |                                                                            | N/A       |
| 6720      | 12          |                | Engineering Data sample 83, DAA Processor Board Temperature   | deg C                      |                                                                            | N/A       |
| 6900      | 12          | 1DFK0          | Engineering Data sample 65, DAA Processor Board Temperature   |                            | N/A                                                                        | N/A       |
| 6000      | 12          | ****           | Engineering Data sample 64, unused                            | N/A<br>N/A                 | N/A                                                                        | N/A       |
| 6060      | 12          | ТРАРС          | Engineering Data - sample 86 DAA ADC Electronics Temperature  |                            | N/A                                                                        | N/A       |
| 7040      | 12          |                | Engineering Data - sample 87, DAA Radiator Temperature        | deg C                      |                                                                            | N/A       |
| 7040      | 12          | SDSS1          | Engineering Data - sample 01, DAA Nadiator Temperature        | Counte                     |                                                                            | N/A       |
| 7120      | 12          | SP331<br>SPST1 | Engineering Data sample 80, SPS 1 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 7200      | 12          | SPS97          | Engineering Data sample 00, SPS 2 Narrow Output               | Counts                     |                                                                            | N/A       |
| 7200      | 12          | SPST2          | Engineering Data sample 91, SPS 2 Wide Output (Threshold)     | Counts                     |                                                                            | N/A       |
| 7440      | 12          | +12VDMON       | Engineering Data sample 92, DAA +121/                         | Volte                      |                                                                            | N/A       |
| 7520      | 12          |                | Engineering Data - sample 93, DAA -12V                        | Volte                      |                                                                            | N/A       |
| 7600      | 12          | +15VDMON       | Engineering Data - sample 30, DAA - 12V                       | Volte                      |                                                                            | N/A       |
| 7680      | 12          | -15VDMON       | Engineering Data sample 95, DAA -15V                          | Volts                      |                                                                            | N/A       |
| 7760      | 12          | +130MON        | Engineering Data sample 96, DAA +130V                         | Volts                      |                                                                            | N/A       |
| 7840      | 12          | -130MON        | Engineering Data - sample 97, DAA -130V                       | Volte                      |                                                                            | N/A       |
| 7040      | 12          | ****           | Engineering Data - sample 37, DAA - 100V                      | N/A                        | N/Δ                                                                        | N/A       |
| 8000      | 12          | SDSS1          | Engineering Data - sample 30, SPS 1 Narrow Output             | Counte                     |                                                                            | N/A       |
| 8080      | 12          | SPST1          | Engineering Data - sample 100, SPS 1 Wide Output (Threshold)  | Counts                     |                                                                            | N/A       |
| 8160      | 12          | SPSS2          | Engineering Data sample 100, 01 0 1 Wide Output (Inteshold)   | Counts                     |                                                                            | N/A       |
| 8240      | 12          | SPST2          | Engineering Data sample 102, SPS 2 Wide Output (Threshold)    | Counts                     |                                                                            | N/A       |
| 8320      | 12          | +VBMON         | Engineering Data sample 102, of 02 white output (Theshold)    | Volts                      |                                                                            | N/A       |
| 8400      | 12          | -VBMON         | Engineering Data sample 104, Sensor -120V bias                | Volts                      |                                                                            | N/A       |
| 8480      | 12          | +5VDMON        | Engineering Data sample 105, DAA +5                           | Volts                      |                                                                            | N/A       |
| 8560      | 12          | +10VRMON       | Engineering Data sample 106, DAA +10V Reference               | Volts                      |                                                                            | N/A       |
| 8640      | 12          | -10VRMON       | Engineering Data sample 100, DAA -10V Reference               | Volts                      |                                                                            | N/A       |
| 8720      | 12          |                | Engineering Data sample 107, DA -107 Reference                | Volts                      |                                                                            | N/A       |
| 8800      | 12          | DAAGND?        | Engineering Data sample 100, DAA Ground #1                    | Volts                      |                                                                            | N/A       |
| 0000      | 14          | DAAONDZ        |                                                               | Volta                      |                                                                            | N/A       |

| 8880         12         SPS1         Engineering Data sample 110, SPS 1 Narrow Output         Counts           8960         12         SPST1         Engineering Data sample 111, SPS 1 Wide Output (Threshold)         Counts           9140         12         SPSS2         Engineering Data sample 113, SPS 2 Nirow Output         Counts           9120         12         SPST2         Engineering Data sample 113, SPS 2 Wide Output (Threshold)         Counts           9200         12         THTOT         Engineering Data sample 114, Total Control Temperature         deg C           9280         12         TSTOT         Engineering Data sample 115, Total Sensor Temperature Monitor         deg C           9360         12         THSW         Engineering Data sample 118, WC Sensor Temperature Monitor         deg C           9440         12         TSSW         Engineering Data sample 118, UW Control Temperature         deg C           9520         12         THLW         Engineering Data sample 118, UW Control Temperature         deg C           9600         12         TSLW         Engineering Data sample 119, LW Sensor Temperature Monitor         deg C           9600         12         TSLW         Engineering Data sample 120, ECA Torque Output         in-oz           9760         12 <th></th> <th>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A</th> |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|--------------------------------------------------------------------|
| 8960       12       SPST1       Engineering Data sample 111, SPS 1 Wide Output (Threshold)       Counts         9040       12       SPSS2       Engineering Data sample 113, SPS 2 Narrow Output       Counts         9120       12       SPST2       Engineering Data sample 113, SPS 2 Wide Output (Threshold)       Counts         9200       12       THTOT       Engineering Data sample 114, Total Control Temperature       deg C         9280       12       TSTOT       Engineering Data sample 115, Total Sensor Temperature Monitor       deg C         9360       12       THSW       Engineering Data sample 116, SW Control Temperature       deg C         9360       12       THSW       Engineering Data sample 116, SW Control Temperature Monitor       deg C         9440       12       TSSW       Engineering Data sample 118, LW Control Temperature Monitor       deg C         9500       12       THLW       Engineering Data sample 119, LW Sensor Temperature Monitor       deg C         9600       12       TSLW       Engineering Data sample 120, ECA Torque Output       in-oz         9680       12       ETRQ       Engineering Data sample 121, SPS 1 Narrow Output       Counts         9760       12       SPST1       Engineering Data sample 122, SPS 1 Wide Output (Threshold                                                                                                                          |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A |
| 9040     12     SPSS2     Engineering Data sample 112, SPS 2 Narrow Output     Counts       9120     12     SPST2     Engineering Data sample 113, SPS 2 Wide Output (Threshold)     Counts       9200     12     THTOT     Engineering Data sample 114, Total Control Temperature     deg C       9280     12     TSTOT     Engineering Data sample 115, Total Sensor Temperature Monitor     deg C       9360     12     THSW     Engineering Data sample 116, SW Control Temperature     deg C       9440     12     TSSW     Engineering Data sample 116, SW Control Temperature     deg C       9440     12     TSW     Engineering Data sample 118, LW Control Temperature     deg C       9500     12     THLW     Engineering Data sample 118, LW Control Temperature     deg C       9600     12     TSLW     Engineering Data sample 112, SPS 1 Narrow Output     in-oz       9600     12     ETRQ     Engineering Data sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data sample 121, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data sample 123, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data sample 123, SPS 2 Narrow Output     Counts       9840 <t< td=""><td></td><td>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A</td></t<>                                                           |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A |
| 9120       12       SPS12       Engineering Data sample 113, SPS 2 Wide Output (Ihreshold)       Counts         9200       12       THTOT       Engineering Data sample 114, Total Control Temperature       deg C         9280       12       TSTOT       Engineering Data sample 115, Total Sensor Temperature Monitor       deg C         9380       12       THSW       Engineering Data sample 116, SW Control Temperature Monitor       deg C         9440       12       TSSW       Engineering Data sample 118, LW Control Temperature Monitor       deg C         9520       12       THLW       Engineering Data sample 118, LW Control Temperature Monitor       deg C         9600       12       TSLW       Engineering Data sample 118, LW Control Temperature Monitor       deg C         9600       12       TSLW       Engineering Data sample 118, LW Control Temperature Monitor       deg C         9600       12       TSLW       Engineering Data sample 120, ECA Torque Output       in-oz         9760       12       SPS11       Engineering Data sample 122, SPS 1 Wide Output (Threshold)       Counts         9840       12       SPS11       Engineering Data sample 123, SPS 2 Narrow Output       Counts         9840       12       SPS12       Engineering Data sample 124, SPS 1 Nar                                                                                                                          |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A |
| 9200     12     I H I O I     Engineering Data sample 114, I otal Control I emperature     deg C       9280     12     TSTOT     Engineering Data sample 115, Total Sensor Temperature Monitor     deg C       9360     12     THSW     Engineering Data sample 116, SW Control Temperature Monitor     deg C       9440     12     TSSW     Engineering Data sample 116, Total Sensor Temperature Monitor     deg C       9520     12     THLW     Engineering Data sample 118, LW Control Temperature Monitor     deg C       9600     12     TSLW     Engineering Data sample 119, LW Sensor Temperature Monitor     deg C       9600     12     TSLW     Engineering Data sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data sample 120, ECA Torque Output     Counts       9840     12     SPST1     Engineering Data sample 123, SPS 1 Narrow Output     Counts       9820     12     SPSS2     Engineering Data sample 123, SPS 2 Narrow Output     Counts       9920     12     SPST2     Engineering Data sample 124, SPS 2 Wide Output (Threshold)     Counts       10000     12     HDACTOT     Engineering Data sample 126, SW Heater DAC Value     Counts       10160     12     HDACSW     Engineering Data sample 126, SW Heater DAC Value     Counts                                                                                                                                      |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A |
| 9280     12     ISTOT     Engineering Data - sample 115, Total Sensor Temperature Monitor     deg C       9360     12     THSW     Engineering Data - sample 116, SW Control Temperature     deg C       9440     12     TSSW     Engineering Data - sample 116, SW Control Temperature     deg C       9520     12     THLW     Engineering Data - sample 118, LW Control Temperature     deg C       9600     12     TSLW     Engineering Data - sample 118, LW Control Temperature Monitor     deg C       9600     12     ETRQ     Engineering Data - sample 119, LW Sensor Temperature Monitor     deg C       9760     12     SPSS1     Engineering Data - sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data - sample 121, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data - sample 123, SPS 1 Narrow Output     Counts       9840     12     SPSS2     Engineering Data - sample 123, SPS 2 Narrow Output     Counts       9840     12     SPSS2     Engineering Data - sample 123, SPS 2 Narrow Output     Counts       10800     12     SPST2     Engineering Data - sample 124, SPS 2 Wide Output (Threshold)     Counts       100800     12     HDACTOT     Engineering Data - sample 126, SW Heater DAC Value     Counts       10160 <td></td> <td>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A</td>                                  |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A        |
| 9360     12     IHSW     Engineering Data     sample 116, SW Control Temperature     deg C       9440     12     TSSW     Engineering Data     sample 117, SW Sensor Temperature Monitor     deg C       9620     12     THLW     Engineering Data     sample 118, LW Control Temperature Monitor     deg C       9600     12     TSLW     Engineering Data     sample 119, LW Sensor Temperature Monitor     deg C       9600     12     TSLW     Engineering Data     sample 120, ECA Torque Output     in-oz       9760     12     SPSQ     Engineering Data     sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data     sample 121, SPS 1 Narrow Output     Counts       9840     12     SPST1     Engineering Data     sample 123, SPS 2 Narrow Output     Counts       9840     12     SPSS2     Engineering Data     sample 123, SPS 2 Narrow Output     Counts       10000     12     SPSS2     Engineering Data     sample 124, SPS 2 Narrow Output     Counts       10000     12     HDACTOT     Engineering Data     sample 125, Total Heater DAC Value     Counts       10160     12     HDACSW     Engineering Data     sample 126, SW Heater DAC Value     Counts       10160     12     HDACLW                                                                                                                                                                                              |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A               |
| 9440     12     ISSW     Engineering Data - sample 117, SW Sensor Temperature Monitor     deg C       9520     12     THLW     Engineering Data - sample 118, LW Control Temperature Monitor     deg C       9600     12     TSLW     Engineering Data - sample 119, LW Sensor Temperature Monitor     deg C       9680     12     ETRQ     Engineering Data - sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data - sample 121, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data - sample 123, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data - sample 123, SPS 1 Narrow Output     Counts       9840     12     SPSS2     Engineering Data - sample 123, SPS 2 Narrow Output     Counts       9920     12     SPSS2     Engineering Data - sample 124, SPS 2 Wide Output (Threshold)     Counts       10000     12     SPST2     Engineering Data - sample 125, Total Heater DAC Value     Counts       10160     12     HDACTOT     Engineering Data - sample 126, SW Heater DAC Value     Counts       10160     12     HDACSW     Engineering Data - sample 126, SW Heater DAC Value     Counts       10240     12     HDACLW     Engineering Data - sample 127, LW Heater DAC Value     Counts       10320                                                                                                                           |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A                      |
| 9520     12     IHLW     Engineering Data sample 118, LW Control Temperature     deg C       9600     12     TSLW     Engineering Data sample 119, LW Sensor Temperature Monitor     deg C       9600     12     ETRQ     Engineering Data sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data sample 120, ECA Torque Output     in-oz       9760     12     SPSS1     Engineering Data sample 121, SPS 1 Narrow Output     Counts       9840     12     SPSS1     Engineering Data sample 123, SPS 1 Nide Output (Threshold)     Counts       9920     12     SPSS2     Engineering Data sample 123, SPS 2 Narrow Output     Counts       10000     12     SPST2     Engineering Data sample 124, SPS 2 Wide Output (Threshold)     Counts       10080     12     HDACTOT     Engineering Data sample 126, SW Heater DAC Value     Counts       10160     12     HDACSW     Engineering Data sample 126, SW Heater DAC Value     Counts       10240     12     HDACLW     Engineering Data sample 126, SW Heater DAC Value     Counts       10320     12     TBBLWM     Engineering Data sample 128, Total Blackbody Temperature     deg C       10400     12     TBBLWM     Engineering Data sample 128, Total Blackbody Temperature     deg C <td></td> <td>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A<br/>N/A</td>                                                                                            |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A<br>N/A                             |
| 9600         12         ISLW         Engineering Data - sample 119, LW Sensor Temperature Monitor         deg C           9680         12         ETRQ         Engineering Data - sample 120, ECA Torque Output         in-oz           9760         12         SPSS1         Engineering Data sample 121, SPS 1 Narrow Output         Counts           9840         12         SPST1         Engineering Data sample 122, SPS 1 Wide Output (Threshold)         Counts           9920         12         SPSS2         Engineering Data sample 123, SPS 2 Narrow Output         Counts           10000         12         SPST2         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10000         12         HDACTOT         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 126, SW Heater DAC Value         Counts           10320         12         TBBLTOTM         Engineering Data sample 127, Total Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                   |              | N/A<br>N/A<br>N/A<br>N/A<br>N/A                                    |
| 9880         12         ETRQ         Engineering Data sample 120, ECA Torque Output         In-oz           9760         12         SPSS1         Engineering Data sample 121, SPS 1 Narrow Output         Counts           9840         12         SPST1         Engineering Data sample 122, SPS 1 Wide Output (Threshold)         Counts           9920         12         SPSS2         Engineering Data sample 123, SPS 2 Narrow Output         Counts           10000         12         SPST2         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10080         12         HDACTOT         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACCW         Engineering Data sample 126, SW Heater DAC Value         Counts           10160         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10320         12         TBBLVM         Engineering Data sample 129, LW Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                  |              | N/A<br>N/A<br>N/A<br>N/A                                           |
| 9/60         12         SPSS1         Engineering Data - sample 121, SPS 1 Narrow Output         Counts           9840         12         SPST1         Engineering Data sample 122, SPS 1 Wide Output (Threshold)         Counts           9920         12         SPSS2         Engineering Data sample 123, SPS 2 Narrow Output         Counts           10000         12         SPST2         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10080         12         HDACTOT         Engineering Data sample 126, SVH de Output (Threshold)         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 126, SW Heater DAC Value         Counts           10320         12         TBBLOTM         Engineering Data sample 126, Total Heater DAC Value         Counts           10400         12         TBBLWM         Engineering Data sample 126, SW Heater DAC Value         Counts                                                                                                                                                                                                                                                                                                                                                               |              | N/A<br>N/A<br>N/A<br>N/A                                           |
| 9840         12         SPS11         Engineering Data sample 122, SPS1 Wide Output (Threshold)         Counts           9920         12         SPSS2         Engineering Data sample 123, SPS 2 Narrow Output         Counts           10000         12         SPST2         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10080         12         HDACTOT         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10160         12         HDACSW         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 127, Total Blackbody Temperature         Counts           10320         12         TBBTOTM         Engineering Data sample 128, Total Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                         |              | N/A<br>N/A<br>N/A                                                  |
| 9920         12         SPSS2         Engineering Data sample 123, SPS 2 Narrow Output         Counts           10000         12         SPST2         Engineering Data sample 124, SPS 2 Wide Output (Threshold)         Counts           10080         12         HDACTOT         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 126, SW Heater DAC Value         Counts           10320         12         TBBTOTM         Engineering Data sample 127, Total Heater DAC Value         Counts           10400         12         TBBLWM         Engineering Data sample 129, Total Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              | N/A<br>N/A                                                         |
| 10000         12         SPS12         Engineering Data sample 124, SPS 2 Wide Output (Ihreshold)         Counts           10080         12         HDACTOT         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10320         12         TBBTOTM         Engineering Data sample 128, Total Heatchody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |              | I N/A                                                              |
| 10080         12         HDACTOT         Engineering Data sample 125, Total Heater DAC Value         Counts           10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10320         12         TBBTOTM         Engineering Data sample 128, Total Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | +                                                                  |
| 10160         12         HDACSW         Engineering Data sample 126, SW Heater DAC Value         Counts           10240         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10320         12         TBBTOTM         Engineering Data sample 128, Total Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |              | N/A                                                                |
| 10240         12         HDACLW         Engineering Data sample 127, LW Heater DAC Value         Counts           10320         12         TBBTOTM         Engineering Data sample 128, Total Blackbody Temperature         deg C           10400         12         TBBLWM         Engineering Data sample 129, LW Blackbody Temperature         deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |              | N/A                                                                |
| 10320     12     IBBIOIM     Engineering Data sample 128, Total Blackbody Temperature     deg C       10400     12     TBBLWM     Engineering Data sample 129, LW Blackbody Temperature     deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              | N/A                                                                |
| 10400 12 TBBLWM Engineering Data sample 129, LW Blackbody Temperature 🥂 Meg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              | N/A                                                                |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | N/A                                                                |
| 10480 12 HDACBB Engineering Data sample 130, Blackbody Heater DAC Value Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              | N/A                                                                |
| 10560 12 ATRQ Engineering Data sample 131, ACA Torque Output in-oz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              | N/A                                                                |
| 10640 12 SPSS1 Engineering Data sample 132, SPS 1 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | N/A                                                                |
| 10/20 12 SPS11 Engineering Data sample 133, SPS1 Wide Output (Threshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | N/A                                                                |
| 10800 12 SPSS2 Engineering Data sample 134, SPS 2 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | N/A                                                                |
| 10880 12 SPS12 Engineering Data sample 135, SPS 2 Wide Output (Threshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              | N/A                                                                |
| 10960 12 Engineering Data sample 136, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11040 12 Engineering Data sample 137, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11120 12 Engineering Data sample 138, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11200 12 Engineering Data sample 139, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11280 12 Engineering Data sample 140, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11360 12 Engineering Data sample 141, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11440 12 Engineering Data sample 142, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 11520 12 SPS51 Engineering Data sample 143, SPS 1 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | N/A                                                                |
| 11600 12 SPS11 Engineering Data sample 144, SPS1 Wide Output (Infreshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              | N/A                                                                |
| 11680 12 SPSS2 Engineering Data sample 145, SPS 2 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | N/A                                                                |
| 11/60 12 SPS12 Engineering Data sample 146, SPS2 Wide Output (Threshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |              | N/A                                                                |
| 11840 12 BRPOS Engineering Data sample 14/, Azimuth Caging/Brake Position Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              | N/A                                                                |
| 11920 12 Engineering Data - sample 148, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N/A          | N/A                                                                |
| 12000 12 IAZOL Engineering Data - sample 149, Azimuth Lower Bearing Temperature deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N1/A         | N/A                                                                |
| 12/280 12 Engineering Data Sampe 150, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 12100 12 IACA Engineering Jata – sample 151, ACA Electronics Temperature deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |              | N/A                                                                |
| 12240 12 ACTRKP Engineering Data sample 152, ACA Encoder Clear Track A Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              | N/A                                                                |
| 12320 12 ACTRNC Engineering Data sample 153, ACA Encoder Clear Track B Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |              | N/A                                                                |
| 12400 12 SPSS1 Engineering Data sample 154, SPS 1 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |              | N/A                                                                |
| 12480 12 SPS11 Engineering Data - sample 155, SPS1 Wide Output (Inreshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |              | N/A                                                                |
| 12000 12 SFSS2 Engineering Data - sample 156, SFS 2 Narrow Output Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |              | N/A                                                                |
| 12040 12 SF512 Engineering Data - sample 157, SF5 2 Wide Output (Inreshold) Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | N1/A         | N/A                                                                |
| 12/20 12 Engineering Data sample 158, inused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 12800 12 IPRO Engineering Data sample 159, ICA Processor Board Temperature deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |              | N/A                                                                |
| 12880 12 Engineering Lata - sample 160, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |              | N/A                                                                |
| 12 IIADC Engineering Data sample 161, ICA ADC Electronics Temperature deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |              | N/A                                                                |
| 13040 12 IPCA Engineering Data sample 162, PCA Electronics Temperature deg C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | <b>N</b> 1/A | N/A                                                                |
| 13120 12 Engineering Data sample 163, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |
| 13200 12 Engineering Data sample 164, unused N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A          | N/A                                                                |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                                        | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type  |
|-----------|-------------|---------------|--------------------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|------------|
| 13280     | 12          | SPSS1         | Engineering Data sample 165, SPS 1 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 13360     | 12          | SPST1         | Engineering Data sample 166, SPS 1 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 13440     | 12          | SPSS2         | Engineering Data sample 167, SPS 2 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 13520     | 12          | SPST2         | Engineering Data sample 168, SPS 2 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 13600     | 12          | THTOT         | Engineering Data sample 169, Total Control Temperature             | deg C                      |                                                                            | N/A        |
| 13680     | 12          | TSTOT         | Engineering Data sample 170, Total Sensor Temperature Monitor      | deg C                      |                                                                            | N/A        |
| 13760     | 12          | THSW          | Engineering Data sample 1/1, SW Control Temperature                | deg C                      |                                                                            | N/A        |
| 13840     | 12          | TSSW          | Engineering Data sample 1/2, SW Sensor Temperature Monitor         | deg C                      |                                                                            | N/A        |
| 13920     | 12          | THLW          | Engineering Data sample 173, LW Control Temperature                | deg C                      |                                                                            | N/A        |
| 14000     | 12          | ISLW          | Engineering Data sample 1/4, LW Sensor Temperature Monitor         | deg C                      |                                                                            | N/A        |
| 14080     | 12          | EIRQ          | Engineering Data sample 1/5, ECA Torque Output                     | in-oz                      |                                                                            | N/A        |
| 14160     | 12          | SPSS1         | Engineering Data sample 176, SPS 1 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 14240     | 12          | SPS11         | Engineering Data sample 177, SPS 1 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 14320     | 12          | SPSS2         | Engineering Data sample 178, SPS 2 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 14400     | 12          | SPS12         | Engineering Data sample 179, SPS 2 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 14480     | 12          | HDACTOT       | Engineering Data sample 180, Total Heater DAC Value                | Counts                     |                                                                            | N/A        |
| 14560     | 12          | HDACSW        | Engineering Data sample 181, SW Heater DAC Value                   | Counts                     |                                                                            | N/A        |
| 14640     | 12          | HDACLVV       | Engineering Data sample 182, LVV Heater DAC Value                  | Counts                     |                                                                            | N/A        |
| 14/20     | 12          | IBBIOIM       | Engineering Data sample 183, Total Blackbody Temperature           | deg C                      |                                                                            | N/A        |
| 14800     | 12          | IBBLVVM       | Engineering Data sample 184, LVV Blackbody Temperature             | deg C                      |                                                                            | N/A        |
| 14880     | 12          | HDACBB        | Engineering Data sample 185, Blackbody Heater DAC Value            | Counts                     |                                                                            | N/A        |
| 14960     | 12          | AIRQ          | Engineering Data sample 186, ACA Torque Output                     | In-oz                      |                                                                            | N/A        |
| 15040     | 12          | SPSS1         | Engineering Data sample 187, SPS 1 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 15120     | 12          | SPS11         | Engineering Data sample 188, SPS 1 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 15200     | 12          | SPSS2         | Engineering Data sample 189, SPS 2 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 15280     | 12          | SPS12         | Engineering Data sample 190, SPS 2 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 15360     | 12          | TPCARAD       | Engineering Data sample 191, PCA Radiator Temperature              | deg C                      |                                                                            | N/A        |
| 15440     | 12          |               | Engineering Data sample 192, ICA Radiator Temperature              | deg C                      |                                                                            | N/A        |
| 15520     | 12          | TPED1         | Engineering Data sample 193, Pedestal Temperature # 1 (Radiator)   | deg C                      |                                                                            | N/A        |
| 15600     | 12          | IPED2         | Engineering Data sample 194, Pedestal Temperature # 2 (@ Isolator) | deg C                      |                                                                            | N/A        |
| 15680     | 12          | +5MUN         | Engineering Data sample 195, ICA +5V Digital                       | Volts                      | N1/A                                                                       | N/A        |
| 15/60     | 12          | ****          | Engineering Data sample 195, unused                                | N/A                        | N/A                                                                        | N/A        |
| 15840     | 12          | SDSS1         | Engineering Data sample 197, unused                                | IN/A                       | N/A                                                                        | N/A        |
| 15920     | 12          | 5F551         | Engineering Data sample 196, SPS 1 Martow Output                   | Counts                     |                                                                            | N/A        |
| 16000     | 12          | 3F311         | Engineering Data sample 199, 3PS ( Wide Output ( Inteshold)        | Counts                     |                                                                            | N/A        |
| 16160     | 12          | SF332         | Engineering Data Sample 200, 3F3 2 Narrow Output                   | Counts                     |                                                                            | N/A        |
| 16240     | 12          | +15\/MON      | Engineering Data sample 201, SF3 2 Wide Output (Threshold)         | Volte                      |                                                                            | N/A        |
| 16220     | 12          | +15VMON       | Engineering Data - sample 202, ICA +15V (to ECA/ACA)               | Volts                      |                                                                            | N/A<br>N/A |
| 16400     | 12          | +5V/4MON      | Engineering Data - sample 203, ICA + 5V (to ECA/ACA)               | Volte                      |                                                                            | N/A        |
| 16490     | 12          | +10\/BMON     | Engineering Data sample 204, ICA +10V Allalog                      | Volte                      |                                                                            | N/A        |
| 16560     | 12          | ****          | Engineering Data sample 200, ICA + 10V bidS                        |                            | Ν/Δ                                                                        | N/A        |
| 16640     | 12          | +15\/AMON     | Engineering Data sample 200, unused                                | Volte                      | 11/17                                                                      | N/A        |
| 16720     | 12          |               | Engineering Data sample 207, ICA + 157 (Internal)                  | Volte                      |                                                                            | N/A        |
| 16800     | 12          | SPSS1         | Engineering Data sample 200, ICA -10V (Internal)                   | Counte                     |                                                                            | N/A        |
| 16880     | 12          | SPST1         | Engineering Data sample 200, OF 0 1 Narrow Output                  | Counts                     |                                                                            | N/A        |
| 16960     | 12          | SPSS2         | Engineering Data sample 210, SFS 1 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 17040     | 12          | SPST2         | Engineering Data sample 212, SPS 2 Wide Output (Threshold)         | Counts                     |                                                                            | N/A        |
| 17120     | 12          | ****          | Engineering Data sample 213 unused                                 | N/A                        | N/A                                                                        | N/A        |
| 17200     | 12          | ****          | Engineering Data sample 214 unused                                 | N/A                        | N/A                                                                        | N/A        |
| 17280     | 12          | ***           | Engineering Data sample 215, unused                                | N/A                        | N/A                                                                        | N/A        |
| 17360     | 12          | ****          | Engineering Data sample 216, unused                                | N/A                        | N/A                                                                        | N/A        |
| 17440     | 12          | ****          | Engineering Data sample 210, dirused                               | N/A                        | Ν/Δ                                                                        | Ν/Δ        |
| 17520     | 12          | ****          | Engineering Data sample 217, unused                                | N/A                        | Ν/Δ                                                                        | N/A        |
| 17600     | 12          | ****          | Engineering Data sample 219, unused                                | N/A                        | N/A                                                                        | N/A        |
| 17000     | 14          |               |                                                                    | 1.071                      | 147 V                                                                      | 1971       |

#### 4.4.7.13 Calibration Data

The CERES will generate one calibration data packet (APID 147) every 6.6 second scan cycle if it is in the Solar Calibration Science Mode. The packet format and user data field content is identical to the Science Data packet. Only the APID and the values in the packet identification fields will differ from the Science Data packet. Since the CERES performs a 6.6 second scan, the same engineering, sensor and gimbal fields are repeated 660 times. Table 4.5.3 lists the content of the 6980-byte user data field. Table 4.5.4 lists the repeating engineering data entries. Figure 4.5-7 shows the structure of the CERES Calibration Data packet.



#### 4.4.7.14 Diagnostic Data

The CERES generates a diagnostic packet (APID 150) every 6.6 seconds when the packet type is commanded to one of four values indicated in the Science Data Packet Indicator Field – No Archive, Memory Dump, Gimbal, or Execution Time Data. No Archive Data is commanded when CERES enters a safe, Standby/Hold, or Diagnostic mode. Memory dumps, as well as other diagnostic data collection, are usually done in Science Mode, not in Diagnostic Mode. The packet has the same basic format as the science data packet, except the four diagnostic data types replace the science packet's sensor outputs in each of the 660 samples. The diagnostic data consists of sensor data not intended for science processing, DAP and ICP memory data, azimuth and elevation gimbal error, or DAP and ICP execution time data sets, respectively. The packet begins with identification fields, contains 660 samples of engineering values, the selected diagnostic type, and gimbal positions, and ends with instrument status data.

The CERES Diagnostic Data packet is 6994 bytes in length and has an average data rate of 8477.6 bps. Its structure is shown in Figure 4.5-8. The secondary header, formatted according to Table 4.1.3, contains the timestamp marking the beginning of the CERES scan. The contents of the 6980-byte user data field are shown in Table 4.5.5. Table 4.5.4 has the same engineering fields applicable to the Diagnostic packet as to all the other CERES mission data packets.



|           |       |               |                                       | Units       | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
|-----------|-------|---------------|---------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit   | Mnemonic Name | Description                           | OR          |                                                        | Data Type |
|           | Size  |               | Description                           | State Value | State Name                                             | Data Type |
|           |       |               |                                       |             |                                                        |           |
| 0         | 6     | N/A           | unused                                | N/A         | N/A                                                    | N/A       |
|           |       | QLOOKFLG      |                                       | 0           | QUICK LOOK Flag Not Set                                |           |
| 6         | 1     |               | Quick Look Flag                       | 1           | Quick Look Flag Set                                    | В         |
| <u> </u>  | 1     | N/A           | unused                                | N/A         | N/A                                                    | N/A       |
| 8         | 8     | N/A           | spare                                 | N/A         | N/A                                                    | N/A       |
|           |       |               |                                       | 1           | Collibration Data                                      |           |
|           |       |               |                                       | 2           | Moment Dump Data                                       |           |
|           |       |               |                                       | 2           | Gimbal Data                                            |           |
|           |       |               |                                       | 4           | Execution Time Data                                    |           |
|           |       |               |                                       | 5           | No Archive Data                                        |           |
|           |       |               |                                       | ê           | Fixed Pattern                                          |           |
| 16        | 4     | PKTIND        | Science Packet Data Indicator         | 7-15        | Not Used                                               | в         |
| 20        | 5     | PKTVERS       | Packet Data Version                   | N/A         | N/A                                                    | N/A       |
|           |       |               |                                       | 0           | IFTM                                                   |           |
|           |       |               |                                       | 1           | PFM                                                    |           |
|           |       |               |                                       | 2           | FM1                                                    |           |
|           |       |               |                                       | 3           | FM2                                                    |           |
|           |       |               |                                       | 4           | FM3                                                    |           |
|           |       |               |                                       | 5           | FM4                                                    |           |
|           |       |               |                                       | 6           | FM5                                                    |           |
| 25        | 5     | INSTR_ID      | Instrument ID Number                  | 7-31        | Not Used                                               | В         |
|           |       |               |                                       | 0           | Quick Look Flag Not Set                                |           |
| 30        | 1     | QLOOKFLG      | Science Packet Quicklook Flag Status  | 1           | Quick Look Flag Set                                    | В         |
|           |       |               |                                       | 0           | Based on Spacecraft Timing                             |           |
| 31        | 1     | TIME_ID       | Packet Timecode Indicator             | 1           | Based on Instrument Timing                             | В         |
| 32        | 16    | PRICOUNT      | Packet Counter                        | N/A         | N/A                                                    | N/A       |
| 48        | 32    | N/A           | spare                                 | N/A         | N/A                                                    | N/A       |
| 00        | 12    | N/A           | Engineering Data Sample 0             | N/A         | N/A                                                    | N/A       |
| 92        | 4     | N/A           | DAP Diagnostic Memory Data sample 0   | N/A         | N/A                                                    | N/A       |
| 112       | 16    | N/A           | ICP Diagnostic Memory Data sample 0   | N/A         | N/A                                                    | N/A       |
| 128       | 16    | N/A           | Elevation Position sample 0           | N/A         | N/A                                                    | N/A       |
| 144       | 16    | N/A           | Azimuth Position sample 0             | N/A         | N/A                                                    | N/A       |
| 160       | 12    | N/A           | Engineering Data sample 1             | N/A         | N/A                                                    | N/A       |
| 172       | 4     | N/A           | unused                                | N/A         | N/A                                                    | N/A       |
| 176       | 16    | N/A           | DAP Diagnostic Memory Data sample 1   | N/A         | N/A                                                    | N/A       |
| 192       | 16    | N/A           | ICP Diagnostic Memory Data sample 1   | N/A         | N/A                                                    | N/A       |
| 208       | 16    | N/A           | Elevation Position sample 1           | N/A         | N/A                                                    | N/A       |
| 224       | 16    | N/A           | Azimuth Position sample 1             | N/A         | N/A                                                    | N/A       |
| 240       | 52560 | N/A           | Samples 2-658                         | N/A         | N/A                                                    | N/A       |
| 52800     | 12    | N/A           | Engineering Data sample 659           | N/A         | N/A                                                    | N/A       |
| 52812     | 4     | N/A           | unused                                | N/A         | N/A                                                    | N/A       |
| 52816     | 16    | N/A           | DAP Diagnostic Memory Data sample 659 | N/A         | N/A                                                    | N/A       |
| 52832     | 16    | N/A           | ICP Diagnostic Memory Data sample 659 | N/A         | N/A                                                    | N/A       |
| 52848     | 16    | N/A           | Elevation Position sample 659         | N/A         | N/A                                                    | N/A       |
| 52864     | 16    | N/A           | Azimuth Position sample 659           | N/A         | N/A                                                    | N/A       |
|           |       |               | <b>V</b>                              |             |                                                        |           |
|           |       |               |                                       |             |                                                        |           |
|           |       |               |                                       |             |                                                        |           |
|           |       |               |                                       |             |                                                        |           |
|           |       |               |                                       |             |                                                        |           |

#### Table 4.5.5 CERES Diagnostic Packet User Data Fields

| Start Bit | Bit<br>Size | Mnemonic Name | Description                           | Units<br>OR<br>State Value                                                                  | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                    | Data Type |
|-----------|-------------|---------------|---------------------------------------|---------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 52880     | 5           | ISEQMODE      | Instrument Mode (Sequence #)          | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>31    | Safe Mode<br>Standby Mode<br>Crosstrack Mode<br>Biaxial Mode<br>Solar Calibration Mode<br>Diagnostic Configuration Mode<br>Internal Calibration Mode<br>Special Short Scan Mode<br>Contamination Safte Mode<br>Hold Mode<br>Abbrevd Internal Cal Mode<br>Internal Sequence 11 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 15 (Unused)<br>Internal Sequence 15 (Unused)<br>Internal Sequence 15 (Unused)<br>Not Available | В         |
| 52885     | 5           | ISEQPMODE     | Instrument Previous Mode (Sequence #) | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15<br>16-31 | Safe Mode<br>Standby Mode<br>Crosstrack Mode<br>Biaxial Mode<br>Solar Calibration Mode<br>Diagnostic Configuration Mode<br>Internal Calibration Mode<br>Special Short Scan Mode<br>Contamination Safte Mode<br>Hold Mode<br>Abbrev'd Internal Cal Mode<br>Internal Sequence 11 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 13 (Unused)<br>Internal Sequence 14 (Unused)<br>Internal Sequence 15 (Unused)<br>Not Available                                                                  | В         |
| 52890     | 3           | SEQCHG        | Mode (Sequence) Changed By            | 0<br>1<br>2<br>3<br>4-7                                                                     | Command<br>Safe Hold<br>Solar Avoidance<br>Scan Timeout<br>Not Used                                                                                                                                                                                                                                                                                                                                                                                                                                           | В         |
| 52893     | 2           |               | Mode (Sequence) Has Been Changed      | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |           |
| 52895     | 1           | N/A           | Spare                                 | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A       |
| 52896     | 5           | SEQINDEX      | Sequence Command Index                | Counts                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | N/A       |
| 52001     | 2           | SECEVEC       | Services Evolution Status             | 0<br>1<br>2<br>3                                                                            | Executing Sequence Cmds<br>Waiting for Next Scan Period<br>Waiting For Azimuth<br>Sequence Complete                                                                                                                                                                                                                                                                                                                                                                                                           |           |
| 52901     | 3           | SEQEXEC       | Sequence Execution Status             | 4-/                                                                                         | NOT USED                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | В         |
| 52904     | 8           | SEQTIME       | Sequence Time to Next Command         | seconas                                                                                     | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | N/A       |
| 52912     | 16          |               | Time Mark Sample Number               | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u> </u>  |
| 52928     | 16          |               | Lime Mark Microseconds                | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <u> </u>  |
| 52944     | 16          |               | Time Code Sample Number               | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | I         |
| 52960     | 16          |               | I Ime Code Microseconds               | N/A                                                                                         | N/A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1         |

#### Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

# Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit  | Mnemonic Name | Description                          | Units                                                                                 | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)                                                                                                                                                                                                                                                                                                                                                                         | Data Type |
|-----------|------|---------------|--------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           | Size |               |                                      | State Value                                                                           | State Name                                                                                                                                                                                                                                                                                                                                                                                                                     |           |
| 52976     | 16   | N/A           | Spare                                | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            | N/A       |
| 52992     | 16   | CMDCOUNT      | Instrument Command Counter           | Counts                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
| 53008     | 16   | ICMAIN 0      | Instrument Cmd Stack Item 0 - Main   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53024     | 16   | ICPARM 0      | Instrument Cmd Stack Item 0 - Parm   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53040     | 10   | ICSMPL_0      | Instrument Cmd Stack Item 0 - Sample | Counts                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
|           |      |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14          | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Alowed in this Mode<br>Pos A Must Be < Pos B             |           |
| 53050     | 5    | ICSTAT_0      | Instrument Cmd Stack Item 0 - Status | 15-31<br>0                                                                            | Not Used<br>Spacecraft                                                                                                                                                                                                                                                                                                                                                                                                         | В         |
| 53055     | 1    | ICSRC_0       | Instrument Cmd Stack Item 0 - Source | 1                                                                                     | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                              | В         |
| 53056     | 16   | ICMAIN_1      | Instrument Cmd Stack Item 1 - Main   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53072     | 16   | ICPARM_1      | Instrument Cmd Stack Item 1 - Parm   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53088     | 10   | ICSMPL_1      | Instrument Cmd Stack Item 1 - Sample | Counts                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
| 53098     | 5    | ICSTAT_1      | Instrument Cmd Stack Item 1 - Status | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-31 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B<br>Not Used | В         |
|           |      |               |                                      | 0                                                                                     | Spacecraft                                                                                                                                                                                                                                                                                                                                                                                                                     | _         |
| 53103     | 1    | ICSRC_1       | Instrument Cmd Stack Item 1 - Source |                                                                                       | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                              | В         |
| 53104     | 16   |               | Instrument Cmd Stack Item 2 - Main   | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            |           |
| 53120     | 16   | ICPARM_2      | Instrument Cred Stack Item 2 - Parm  | N/A                                                                                   | N/A                                                                                                                                                                                                                                                                                                                                                                                                                            | N1/A      |
|           |      | I BAN         |                                      |                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                | 1 1011    |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                           | Units<br>OR<br>State Value                                                       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                             | Data Type |
|-----------|-------------|---------------|---------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                       | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13           | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Ose Az w- Brake On<br>Mode Not Allowed in this Mode                               |           |
| 53146     | 5           | ICSTAT 2      | Instrument Cmd Stack Item 2 - Status  | 14<br>15-31                                                                      | Pos A Must Be < Pos B<br>Not Used                                                                                                                                                                                                                                                                                                                                                      | в         |
| 50454     | 4           |               | Instrument (and Steel Item 2) Courses | 0                                                                                | Spacecraft                                                                                                                                                                                                                                                                                                                                                                             | Р         |
| 53151     | 16          | ICARU 3       | Instrument Cmd Stack Item 2 - Source  | N/A                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                    | Б         |
| 53168     | 16          | ICPARM 3      | Instrument Cmd Stack Item 3 - Parm    | N/A                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53184     | 10          | ICSMPL 3      | Instrument Cmd Stack Item 3 - Sample  | Counts                                                                           |                                                                                                                                                                                                                                                                                                                                                                                        | N/A       |
| 53104     | 5           | ICSTAT 3      | Instrument Crud Stack Item 3 - Status | 0<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15,31 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B | в         |
| 33134     | 5           | 100171_0      |                                       | 0                                                                                | Spacecraft                                                                                                                                                                                                                                                                                                                                                                             |           |
| 53199     | 1           | ICSRC_3       | Instrument Cmd Stack Item 3 - Source  | 1                                                                                | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                      | В         |
| 53200     | 16          | ICMAIN_4      | Instrument Cmd Stack Item 4 - Main    | N/A                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53216     | 16          | ICPARM_4      | Instrument Cmd Stack Item 4 - Parm    | N/A                                                                              | N/A                                                                                                                                                                                                                                                                                                                                                                                    | NI/A      |
|           |             | <b>DB</b>     |                                       |                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                        |           |

| Start Bit | Bit<br>Size | Mnemonic Name | Description                          | Units<br>OR<br>State Value                                                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                             | Data Type |
|-----------|-------------|---------------|--------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                      | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13        | Cmd Accepted<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Omd Param Out of Range<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode                |           |
| 53242     | 5           | ICSTAT_4      | Instrument Cmd Stack Item 4 - Status | 14<br>15-31                                                                   | Pos A Must Be < Pos B<br>Not Used                                                                                                                                                                                                                                                                                                                                                      | В         |
| 53247     | 1           | ICSRC 4       | Instrument Cmd Stack Item 4 - Source | 0                                                                             | Spacecraft                                                                                                                                                                                                                                                                                                                                                                             | в         |
| 53248     | 16          | ICMAIN 5      | Instrument Cmd Stack Item 5 - Main   | N/A                                                                           | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53264     | 16          | ICPARM 5      | Instrument Cmd Stack Item 5 - Parm   | N/A                                                                           | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53280     | 10          | ICSMPL_5      | Instrument Cmd Stack Item 5 - Sample | Counts                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        | N/A       |
|           |             |               |                                      | 0<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>11<br>12<br>13<br>14 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B |           |
| 53290     | 5           | ICSTAT_5      | Instrument Cmd Stack Item 5 - Status | 15-31                                                                         | Not Used                                                                                                                                                                                                                                                                                                                                                                               | В         |
| 53295     | 1           | ICSRC 5       | Instrument Cmd Stack Item 5 - Source | 1                                                                             | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                      | в         |
| 53296     | 16          | ICMAIN 6      | Instrument Cmd Stack Item 6 - Main   | N/A                                                                           | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53312     | 16          | ICPARM_6      | Instrument Cmd Stack Item 6 - Parm   | N/A                                                                           | N/A                                                                                                                                                                                                                                                                                                                                                                                    |           |
| 53328     | 10          | ICSMPL_6      | Instrument Cmd Stack Item 6 - Sample | Counts                                                                        |                                                                                                                                                                                                                                                                                                                                                                                        | N/A       |
|           |             | pRA           | CHC                                  |                                                                               |                                                                                                                                                                                                                                                                                                                                                                                        |           |

Â.

| Start Bit | Bit<br>Size | Mnemonic Name | Description                            | Units<br>OR<br>State Value                                                   | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                         | Data Type |
|-----------|-------------|---------------|----------------------------------------|------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>0<br>11<br>12<br>13<br>14  | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B |           |
| 53338     | 5           | ICSTAT_6      | Instrument Cmd Stack Item 6 - Status   | 15-31<br>0                                                                   | Not Used<br>Spacecraft                                                                                                                                                                                                                                                                                                                                                                                             | В         |
| 53343     | 1           | ICSRC_6       | Instrument Cmd Stack Item 6 - Source   | 1                                                                            | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                  | В         |
| 53344     | 16          | ICMAIN_7      | Instrument Cmd Stack Item 7 - Main     | N/A                                                                          | N/A                                                                                                                                                                                                                                                                                                                                                                                                                |           |
| 53376     | 10          |               | Instrument Cmd Stack Item 7 - Sample   | N/A<br>Counts                                                                | N/A                                                                                                                                                                                                                                                                                                                                                                                                                | N/A       |
|           |             |               |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14 | Cmd Accepted<br>Cmd Not Used<br>Cmd Index Out of Range<br>Cmd Param Out of Range<br>Not a Valid Short Command<br>Not a Valid Long Command<br>Incorrect Checksum<br>Cmd Exceeded Mode Index<br>Not Accepted in Current mode<br>Not Accepted in Seq Execution<br>Can't Use Brake w- Az Moving<br>Can't Cage Az in Current Pos<br>Can't Move Az w- Brake On<br>Mode Not Allowed in this Mode<br>Pos A Must Be < Pos B |           |
| 53386     | 5           | ICSTAT_7      | Instrument Cmd Stack Item 7 - Status   | 15-31                                                                        | Not Used                                                                                                                                                                                                                                                                                                                                                                                                           | В         |
| 53391     | 1           | ICSRC 7       | Instrument Cmd Stack Item 7 - Source   | 1                                                                            | Internal Sequence                                                                                                                                                                                                                                                                                                                                                                                                  | в         |
| 53392     | 16          | ERRCOUNT      | Instrument Error Counter               | Counts                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A       |
| 53408     | 10          | ERSMPL_0      | Instrument Error Stack Item 0 - Sample | Counts                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                    | N/A       |
|           |             | pBA           | CHro.                                  |                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                    |           |

#### Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                            | Units<br>OR<br>State Value                                                                                                                                 | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Data Type |
|-----------|-------------|---------------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 53/18     | e           | ERTYPE 0      | Instrument Error Stock Item 0. Type    | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>13<br>14<br>15<br>20<br>21<br>22<br>23<br>24<br>22<br>23<br>24<br>25<br>26<br>27-62<br>27-62 | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Revd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat' Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used  | в         |
| 53418     | 6<br>10     | ERSMPL_1      | Instrument Error Stack Item 0 - Type   | Counts                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A       |
|           |             |               |                                        | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62                   | No Error<br>Unexpected Interrupt<br>Illegal Intern'i Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rovd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Cover Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & IcA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used |           |
| 53434     | 6           | ERTYPE_1      | Instrument Error Stack Item 1 - Type   | 63<br>Counts                                                                                                                                               | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | В         |
| 53440     | 10          | ERSMPL_2      | Instrument Error Stack Item 2 - Sample | Counts                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | N/A       |
|           |             |               |                                        |                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |           |

| 0         No Starin         0         No Starin           2         Inlegal Internity Bag Control Value         Process Start STM Illing Chront         Process Start STM Illing Chront           3         Process Start STM Illing Chront         Process Start STM Illing Chront         Process Start STM Illing Chront           6         Red V155 Mag With an Effort         Process Start STM Illing Chront         Process Start STM Illing Chront           7         Nacconsci Into DAA Sync         Process Start STM Illing Chront         Process Start STM Illing Chront           10         Process Start STM Illing Chront         Process Start STM Illing Chront         Process Start STM Illing Chront           11         Starting Park Start Start StM StM Illing Chront         Process Start STM Illing Chront         Process Start STM Illing Chront           12         Starting Park Start Start StM StM StM StM StM StM StM StM StM St | Start Bit      | Bit<br>Size | Mnemonic Name        | Description                                                                    | Units<br>OR<br>State Value                                                                                                                                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Data Type |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------------|--------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 0     No Error       1     Unexpected Interrupt       2     Illegal Inerni Seq Control Value       2     Process Short Cmd Illegal Cmd       4     Process Short Cmd Illegal Cmd       5     Check Illegal Cmd       6     Rovd 1555 Msg With an Error       1     Incorrect Init DMA Sync       8     Illegal Pack Data Indicatr Val       9     Int Seq Index Limit Exceeded       11     Illegal Pack Data Indicatr Val       12     Spurious DAP Cik Interrupt       13     Spurious DCP Cik Interrupt       13     Spurious DCP Cik Interrupt       14     ICA Got To DMA Transfer Late       15-19     Not Used       20     Potent Fail Exake Pos Sensor       21     Potent Fail Exake Pos Sensor       22     Main Cvt Lag Exceeded       23     Science PRLX Transfer Late       24     DAA & EiCA Samp # No Match       25     DAA Reset ber Cont Com Fail       26     Science PRLX Transfer OK       27:62     Not Used       26     Science PRLX Transfer OK       27:62     Not Used       26     Science PRLX Transfer OK       27:62     Not Used       28     Undefined Error       29     Instrument Error Stack Item 3 - Type                                                   | 53450<br>53456 | 6           | ERTYPE_2<br>ERSMPL 3 | Instrument Error Stack Item 2 - Type<br>Instrument Error Stack Item 3 - Sample | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62<br>63<br>Counts      | No Error<br>Unexpected Interrupt<br>Illegal Intern'l Seq Control Value<br>Process Short Grad Illegal Cmd<br>Process Short Grad Illegal Cmd<br>Check Illegal Cmd<br>Revd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskyg Destination Size<br>Spurious DAP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pack tXfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used<br>Undefined Error                          | B         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 53466<br>53472 | 6<br>10     | ERTYPE_3<br>ERSMPL_4 | Instrument Error Stack Item 3 - Type<br>Instrument Error Stack Item 4 - Sample | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>7<br>8<br>9<br>10<br>11<br>12<br>13<br>14<br>15-19<br>20<br>21<br>22<br>23<br>24<br>25<br>26<br>27-62<br>63<br>Counts | No Error<br>Unexpected Interrupt<br>Illegal Intern'l Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Revol 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat' Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Clk Interrupt<br>Spurious DAP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Cover Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used<br>Undefined Error | B         |

#### Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                                                    | Units<br>OR<br>State Value                                                        | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Data Type |
|-----------|-------------|---------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               | Instrument Error Stack Item 4 - Type<br>Instrument Error Stack Item 5 - Sample |                                                                                   | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicat'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>Spurious ICP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used                    |           |
| 53482     | 6           | ERTYPE_4      | Instrument Error Stack Item 5 - Somela                                         | 63<br>Counto                                                                      | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | B         |
| 534988    | 6           |               | Instrument Error Stack Item 5 - Type                                           | Counts 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15-19 20 21 23 24 25 26 27-62 63 Counts | No Error<br>Unexpected Interrupt<br>Illiegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indica'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious ICP Cik Interrupt<br>Spurious ICP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Grake Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science PKX Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used<br>Undefined Error | B         |

## Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                                                    | Units<br>OR<br>State Value                                                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Data Type |
|-----------|-------------|---------------|--------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
|           |             |               | Instrument Error Stack Item 6 - Type<br>Instrument Error Stack Item 7 - Sample |                                                                               | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indicatr Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious DAP Cik Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Brake Pos Sensor<br>Potent Fail Brake Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used                               |           |
| 53514     | 6           | ERTYPE_6      | Instrument Error Stack Item 7 - Type                                           | 63<br>Counto                                                                  | Undefined Error                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | B         |
| 53530     | 6           | ERTYPE_7      | Instrument Error Stack Item 7 - Type                                           | Counts 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15-19 20 21 23 24 25 26 27-62 63 01 | No Error<br>Unexpected Interrupt<br>Illegal Intern'I Seq Control Value<br>Process Short Cmd Illegal Cmd<br>Process Long Cmd Illegal Cmd<br>Check Illegal Cmd<br>Rcvd 1553 Msg With an Error<br>Incorrect Init DMA Sync<br>Illegal Pack Data Indica'r Val<br>Int Seq Index Limit Exceeded<br>Failed At Least 1 DMA Com<br>Illegal Hskpg Destination Size<br>Spurious IOP Clk Interrupt<br>Spurious IOP Clk Interrupt<br>ICA Got To DMA Transfer Late<br>Not Used<br>Potent Fail Cover Pos Sensor<br>Potent Fail Cover Pos Sensor<br>Main Cvr Lag Exceeded<br>Science Pkt Xfer Lockup Det<br>DAA & ICA Samp # No Match<br>DAA Reset bec Cont Com Fail<br>Science Packet Transfer OK<br>Not Used | B         |

## Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name  | Description                                  | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name           | Data Type  |  |
|-----------|-------------|----------------|----------------------------------------------|----------------------------|--------------------------------------------------------------------------------------|------------|--|
|           |             |                |                                              | 0<br>1<br>2                | Bridge Balance Off<br>Bridge Balance Maintenance<br>Bridge Balance Reset             |            |  |
| 53616     | 3           | TBRDGCS        | Total Bridge Bal. Control Status             | <u>3-7</u><br>0            | DAC Value Unchanged                                                                  | В          |  |
| 53619     | 1           | TBRDGDVS       | Total Bridge Bal. DAC Update Status          | 1                          | DAC Value Updated                                                                    |            |  |
| 53620     | 5           | TOTBRST        | I otal Bridge Bal. Reset Calculation Counter | Counts                     | N/A                                                                                  | N/A        |  |
| 53625     | 10          |                | Spare<br>Total Space Look Average            | N/A                        | N/A                                                                                  | N/A        |  |
| 52644     | 12          | IOIBSLA<br>N/A | Total Space Look Average                     | Counts<br>N/A              | Ν/Α                                                                                  | N/A        |  |
| 53644     | 4           |                | Total Bridge Bal, Coarse DAC Value           | Counte                     | N/A                                                                                  | N/A        |  |
| 53660     | 12          | N/A            | Share                                        | N/A                        | Ν/Δ                                                                                  | N/A<br>N/A |  |
| 53664     | 12          |                | Total Bridge Bal, Fine DAC Value             | Counts                     | IN/A                                                                                 | N/A        |  |
| 53676     | 4           | N/A            | Snare                                        | N/A                        | Ν/Δ                                                                                  | N/A        |  |
| 53680     | 3           | SBRDGCS        | SW Bridge Ball Control Status                | 0<br>1<br>2<br>3-7         | Bridge Balance Off<br>Bridge Balance Maintenance<br>Bridge Balance Reset<br>Not Used | B          |  |
| 00000     | 0           | OBILBOOO       |                                              | 0                          | DAC Value Unchanged                                                                  |            |  |
| 53683     | 1           | SBRDGDVS       | SW Bridge Bal. DAC Update Status             |                            | DAC Value Updated                                                                    | В          |  |
| 53684     | 5           | SWBRST         | SW Bridge Bal. Reset Calculation Counter     | Counts                     |                                                                                      | N/A        |  |
| 53689     | 7           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53696     | 12          | SWBSLA         | SW Space Look Average                        | Counts                     |                                                                                      | N/A        |  |
| 53708     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53712     | 12          | SWBBDACC       | SW Bridge Bal. Coarse DAC Value              | Counts                     |                                                                                      |            |  |
| 53724     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53728     | 12          | SWBBDACF       | SW Bridge Bal. Fine DAC Value                | Counts                     |                                                                                      |            |  |
| 53740     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
|           |             |                |                                              | 0                          | Bridge Balance Off<br>Bridge Balance Maintenance                                     |            |  |
|           |             |                |                                              | 2                          | Bridge Balance Reset                                                                 |            |  |
| 52744     | 2           | IBRDGCS        | LW/ Bridge Bal, Control Status               | 3.7                        | Not Lised                                                                            | в          |  |
| 33744     | 5           | EBIODGCS       | Evv Bildge Bai, Control Status               | 0                          | DAC Value Unchanged                                                                  | 0          |  |
| 53747     | 1           | I BRDGDVS      | LW Bridge Bal, DAC Undate Status             | 1                          | DAC Value Undated                                                                    | в          |  |
| 53748     | 5           | LWBRST         | LW Bridge Bal, Reset Calculation Counter     | Counts                     | Bille Value optation                                                                 | N/A        |  |
| 53753     | 7           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53760     | 12          | LWBSLA         | LW Space Look Average                        | Counts                     |                                                                                      | N/A        |  |
| 53772     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53776     | 12          | LWBBDACC       | LW Bridge Bal. Coarse DAC Value              | Counts                     |                                                                                      | N/A        |  |
| 53788     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53792     | 12          | LWBBDACF       | LW Bridge Bal. Fine DAC Value                | Counts                     |                                                                                      | N/A        |  |
| 53804     | 4           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53808     | 10          | BRDGSLS        | Bridge Bal. Space Look Start                 | Sample                     |                                                                                      | N/A        |  |
| 53818     | 6           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53824     | 10          | BRDGSLE        | Bridge Bal. Space Look End                   | Sample                     |                                                                                      | N/A        |  |
| 53834     | 6           | N/A            | Spare                                        | N/A                        | N/A                                                                                  | N/A        |  |
| 53840     | 10          | BRDGUSN        | Bridge Bal. DAC Update Sample Number         | Sample                     | N/A                                                                                  | N/A        |  |
| 53850     | 10          |                | Spare<br>Bridge Bol Window High              | N/A<br>Counto              | N/A                                                                                  | N/A        |  |
| 53969     | 12          |                |                                              | N/A                        | Ν/Δ                                                                                  | N/A        |  |
| 53872     | 4           | BRDGWINI       | Bridge Bal Window Low                        | Counts                     | IN/A                                                                                 | N/A<br>N/A |  |
| 53884     | 12          | N/A            | Snare                                        | N/A                        | N/Δ                                                                                  | N/A<br>N/A |  |
| 53888     | 12          | BRDGWINS       | Bridge Bal Window Set Point                  | Counts                     | IN/7                                                                                 | N/A        |  |
| 53900     | 4           | N/A            | Spare                                        | N/A                        | Ν/Δ                                                                                  | N/A        |  |
| 53904     | 12          | TSTPTT         | Total Detector Temp Setpoint                 | Counts                     | 1903                                                                                 | N/A        |  |
| 00004     | <u>ک</u> ،  |                | real Detector romp, outpoint                 | Counto                     |                                                                                      | 10// 1     |  |

| Start Rt<br>Bose         Mmemonic Name         Description         Units<br>OR<br>Stafe Value         Conversion Confinents (formula or CA, CG, 2C, 2C, 1C, 0)<br>(Stafe Value         OR<br>Stafe Name           63010         1         TOTTCTRL         Total Detector Timp, Control Status         0         Temperature Control OF           63010         1         TOTTCTRL         Total Detector Timp, Control Status         0         Temperature Control OF           63030         1         SWTCTRL         GW Detector Timp, Control Status         0         Temperature Control OF           63030         1         SWTCTRL         GW Detector Timp, Control Status         0         Temperature Control OF           63030         1         UWTCTRL         LW Detector Timp, Stepont         Control         NK         NK           63030         1         UWTCTRL         LW Detector Timp, Stepont         Control         NK         NK           63040         1         BRCTRL         Blackbody Timp, Stepont         Control         NK         NK           63040         1         BRCTRL         Blackbody Timp, Stepont         Control         NK         SWCS Lamp, Off           63040         1         BRCTRL         Blackbody Timp, Stepont         Control         NK         SWCS Lamp, Off      <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     |                            |                                                                            |           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------|---------------|-------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| Image: control of the status         Image: control of the status <th< td=""><td>rt Bit</td><td>Bit<br/>Size</td><td>Mnemonic Name</td><td>Description</td><td>Units<br/>OR<br/>State Value</td><td>Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br/>OR<br/>State Name</td><td>Data Type</td></th<> | rt Bit | Bit<br>Size | Mnemonic Name | Description                         | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
| 5317         3         NA         Spare         NA           5320         12         SWTCTRL         SW Detector Temp Control Situs         1         Temperature Control Off           5333         3         NA         Sware         NA         Temperature Control Off           5333         12         LWSTPTT         LW Detector Temp Setpoint         Counts         NA           5338         12         LWSTPTT         LW Detector Temp Setpoint         Counts         NA           5338         12         LWSTPTL         LW Detector Temp Setpoint         Counts         NA           5338         12         LWSTPTL         LW Detector Temp Setpoint         Counts         NA           5338         12         BESTT         Beactoody Temp Setpoint         Counts         NA           5340         12         BESTT         Beactoody Temp Setpoint         Counts         NA           5366         1         BECTRL         Beactoody Temp Setpoint         1         SWICS Lam (g) Level 1           5366         1         BECTRL         Beactoody Temp Setpoint         1         SWICS Lam (g) Level 1           5366         2         SWICS I Instantly Level         2         SWICS Lam (g) Level 2         SWICS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 916    | 1           | TOTTCTRL      | Total Detector Temp, Control Status | 0                          | Temperature Control Off<br>Temperature Control On                          | в         |
| 53202         12         SWSTPTT         SW Detector Temp. Segont         Courts           53303         1         SWTCRL         SW Detector Temp. Segont         0         Temperature Control Off           53303         12         WTCRL         SW Detector Temp. Segont         Courts         NA           53304         12         WSTPT         LW Detector Temp. Segont         Courts         NA           53305         12         WSTPT         LW Detector Temp. Control Status         0         Temperature Control Off           53466         1         LWTCRL         LW Detector Temp. Control Status         0         Temperature Control Off           53466         1         LWTCRL         LW Detector Temp. Control Status         0         Temperature Control Off           53466         3         N/A         Saparint         Courts         NA         NA           53468         1         BBCTRL         Blackbody Temp. Control         1         Structure Control Off         Structure Control Off           53468         2         SWICSI         Spre         NA         NA         NA           5347         3         N/A         Spre         NA         NA         Structure Control Off           53488                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 917    | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| Status         1         SW TOTRIL         SW Detector Temp. Control Status         0         Temperature Control Off           53383         3         WMA         Status         N/A         N/A           53384         1         LWTCTRL         LW Detector Temp. Control Status         1         Temperature Control Off           53348         1         LWTCTRL         LW Detector Temp. Control Status         1         Temperature Control Off           53349         3         N/A         Spare         N/A         N/A           53349         12         BBSETI         Blackdoxy Temp. Control         1         Temperature Control Off           53349         12         BBSETI         Blackdoxy Temp. Control         1         Temperature Control Off           53364         12         BBSETI         Blackdoxy Temp. Control         1         Temperature Control Off           53365         3         N/A         Spare         N/A         N/A         N/A           53366         2         SWICS1         Blackdoxy Temp. Control         1         SWICS1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 920    | 12          | SWSTPTT       | SW Detector Temp. Setpoint          | Counts                     |                                                                            | N/A       |
| 5352         1         SWTCTRL         SW Detector Temp, Control Status         1         Temperature Control On           5553         3         N/A         NA         NA         NA           5555         12         LIVSTPT         LIV Detector Temp, Control Status         1         Temperature Control Off           5556         12         LIVSTPT         LIV Detector Temp, Control Status         1         Temperature Control Off           5556         3         N/A         Seare         N/A         N/A           5556         3         N/A         Seare         N/A         N/A           5358         1         Blackboth Temp, Control Status         1         Temperature Control Off           53596         1         BBCTRL         Blackboth Temp, Control Status         1         N/A           53597         3         N/A         Spare         N/A         N/A           53597         3         N/A         Spare         N/A         N/A           53597         30         N/A         Spare         N/A         N/A           53597         30         N/A         Spare         N/A         N/A           53597         30         N/A         Spare </td <td></td> <td></td> <td></td> <td></td> <td>0</td> <td>Temperature Control Off</td> <td></td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |             |               |                                     | 0                          | Temperature Control Off                                                    |           |
| 5803         3         NA         Sate         NA         NA         NA           53036         12         LWSPTT         LW Details resp. Setpoint         Counts         Tempenture Control Off           53938         1         LWTCTRL         LW Details resp. Setpoint         0         Tempenture Control Off           53949         3         NA         Sare         NA         NA           53949         3         NA         Sare         NA         NA           53950         12         BSETT         Blackbody Temp. Centrol         0         Tempenture Control Off           53950         3         NA         Spare         NA         NA         NA           53950         3         NA         Spare         NA         SWICS Lamp Off           53950         3         NA         Spare         NA         SWICS Lamp Q Level 2           53950         30         NA         Spare         NA         SWICS Lamp Q Level 3           53950         30         NA         Spare         0         NA           53950         30         NA         Spare         0         NA           53950         30         NA         Spare                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 932    | 1           | SWTCTRL       | SW Detector Temp. Control Status    | 1                          | Temperature Control On                                                     | В         |
| 5398         12         LWSTP11         LW Detector Feinp, Segunt         Counts         Temperature Control Off           53948         3         N/A         State         1         Temperature Control Off           53989         3         N/A         State         N/A         N/A           53952         12         BBSETT         Backbody Temp, Segunt         Counts                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 933    | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| 1         LWTCTRL         LW Detect reng Control Status         1         Temperature Control On           03984         3         N/A         Spire         N/A         MA           03984         1         BBSETT         Blackbody Temp Setpoint         Counts         N/A           03985         3         N/A         Spare         N/A         Temperature Control On           03985         3         N/A         Spare         N/A         MA           03985         3         N/A         Spare         N/A         MA           03985         3         N/A         Spare         N/A         MA           03986         3         N/A         Spare         N/A         Spare           1         SymCS1         SymCS1         SymCS1         SymCS1         SymCS1           1         Spare         N/A         N/A         N/A         SymCS1           1         Spare         N/A         N/A         SymCS1         SymCS1           1         Spare         N/A         N/A         SymCS1         SymCS1           1         Spare         N/A         N/A         SymCS1         SymCS1           1         Call M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 936    | 12          | LWSIPTI       | LW Detector Temp. Setpoint          | Counts                     | Temperature Central Off                                                    | N/A       |
| 13362         1         CMA         Control Status         NA         Temperature Control CH           13362         12         BSERTT         Biackbody Temp. Septiont         Counts         NA         NA           53952         12         BSERTT         Biackbody Temp. Septiont         Counts         NA         NA         NA           53955         3         N/A         Spare         NIA         Temperature Control On         1         Temperature Control On           53956         3         N/A         Spare         NIA         NIA         NIA         SWG SLamp QLevel 2         2         SWG SLamp QLevel 2         3         SWG SLamp QLevel 2         3         SWG SLamp QLevel 2         3         SWG SLamp QLevel 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 040    | 4           |               | I.W. Detector Tomp. Control Status  | 0                          | Temperature Control On                                                     |           |
| 12         BBCT         Blackbody Temp. Setpoint         Counts         Non           63982         1         BBCTRL         Blackbody Temp. Setpoint         0         Temperature Control Off           63984         1         BBCTRL         Blackbody Temp. Setpoint         0         Temperature Control Off           63985         3         N/A         Spare         N/A         N/A           53986         2         SWICS1 tamp Off         SWICS1 tamp Off         SWICS1 tamp Off           53988         2         SWICS1         SWICS1 Intensity Level         3         SWICS tamp Off           53987         30         N/A         SWICS         SWICS1         SWICS1         SWICS1           53988         2         SWICS1         SWICS1         SWICS1         SWICS1         SWICS1           53987         30         N/A         SWICS1         SwicS1         SwicS1         SwicS1         SwicS1           53987         30         N/A         SwicS1         SwicS1         SwicS1         SwicS1           53987         30         N/A         SwicS1         SwicS1         SwicS1         SwicS1           53987         30         N/A         SwicS1         SwicS1 <td>940</td> <td>2</td> <td></td> <td>EW Delector Temp. Control Status</td> <td>NIZA</td> <td></td> <td>D<br/>N/A</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 940    | 2           |               | EW Delector Temp. Control Status    | NIZA                       |                                                                            | D<br>N/A  |
| Losset         Description         Other         Temperature Control Off           63986         1         Bickbody Temp Control         1         Temperature Control On           63985         3         N/A         Spare         N/A         N/A           63986         1         SWICS Lamp Qi Level 1         SWICS Lamp Qi Level 2         SWICS Lamp Qi Level 2           63986         2         SWICS Lamp Qi Level 2         SWICS Lamp Qi Level 2         SWICS Lamp Qi Level 3           63986         2         SWICS Intensity Level         3         SWICS Lamp Qi Level 2           63970         30         N/A         N/A         N/A           63986         2         SWICS Intensity Level         3         Stow           63970         30         N/A         Stow         N/A         N/A           7         Cal Mode 6         Noise Test 1         Noise Test 2         Cal Mode 6           6         Noise Test 2         Cal Mode 6         Cal Mode 6         Cal Mode 6           9         Cal Mode 6           10         Cal Mode 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 949    | 12          | BBSETT        | Blackbody Temp. Setpoint            | Counts                     | ° I₩A                                                                      | N/A       |
| 53986         1         BBCTRL         Blackbody Temp. Control         1         Tempsature Control On           53965         3         N/A         Spare         0         SWICS Lamp Off           53965         2         SWICS Lamp Off         1         SWICS Lamp Off           53966         2         SWICS Lamp Off         2         SWICS Lamp Q Level 1           53970         30         N/A         SWICS Lamp Q Level 2         SWICS Lamp Q Level 1           53970         30         N/A         Spare         N/A         N/A           53970         30         N/A         Spare         N/A         Spare           53970         30         N                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 552    | 12          | BBGETT        | Didokody reinp. deipoint            | 0                          | Temperature Control Off                                                    | 19/73     |
| 33065         3         N/A         N/A         N/A           53965         3         N/A         0         SWICS Lamp @ Level 1           53966         2         SWICSI         SWICS Intensity Level         3         SWICS Lamp @ Level 2           53967         30         N/A         N/A         N/A         N/A           5397         30         N/A         Spare         0         Stow           5397         30         N/A         Spare         0         Stow           5397         30         N/A         Spare         0         Stow           6397         30         N/A         Spare         0         Stow           5397         30         N/A         Spare         0         Stow           6397         3         N/A         Spare         0         Stow           6         N/A         Spare         0         Stow         Stow           6         N/A         Spare         0         Stow         Stow           6         Cal Mode 5         Stow         Cal Mode 6         Cal Mode 6           7         Cal Mode 6         Cal Mode 6         Cal Mode 6         Cal Mode 6     <                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 964    | 1           | BBCTRL        | Blackbody Temp. Control             | 1                          | Temperature Control On                                                     | В         |
| SWICS Lamp Off         SWICS Lamp QL Level 1           53966         2         SWICSI         SWICS Intensity Level         3           53970         30         N/A         Spare         N/A         N/A           2         SWICS Intensity Level         3         SWICS Intensity Career         N/A           30         N/A         Spare         N/A         N/A         N/A           4         A         Natron Intensity Career         N/A         Store Earth Scan           3         MAM Scan         A         A         Natron Intensity Career           4         A         Natron Intensity Career         A         A           5         Call Mode FA         B         Gal Mode FA         B           6         Call Mode FA         B         Gal Mode FA         B         Gal Mode FA           5         Elsevation Scan Mode         1         Gal Mode FA         Gal Mode FA         B         Gal Mode FA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 965    | 3           | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| Signed         2         SWICSI         SWICS Intensity Level         1         SWICS Iamp @ Level 1           53970         30         N/A         SWICS Intensity Level         3         SWICS Iamp @ Level 3           53970         30         N/A         Spare         N/A         N/A           53970         30         N/A         Spare         N/A         N/A           53970         30         N/A         Spare         0         Start           53970         31         N/A         N/A         N/A           53970         30         N/A         Start         N/A           53970         31         N/A         N/A         Start           53970         31         N/A         N/A         Start           53970         31         N/A         N/A         Start           53970         5         N/A         Start         Start           53970         5         N/A         Start         Start           53970         5         N/A         Start         N/A           5         Notes Test 1         Cal Mode 63         Cal Mode 63           5         Notestart         Cal Mode 64         Ca                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |        |             |               |                                     | 0                          | SWICS Lamp Off                                                             |           |
| 3966         2         SWICSI         SWICS Intensity Level         3         SWICS Intensity Level 3           53970         30         N/A         Spare         N/A         NA         NA           53970         30         N/A         Spare         N/A         NA         NA           53970         30         N/A         Sources         0         1         Normal Earth Scan           53970         30         N/A         Spare         N/A         NA         NA           53970         30         N/A         Sources         3         Status         Sources           540         Image: Spare         N/A         Na         Na         Na         Na           541         Image: Spare         Image: Spa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |             |               |                                     | 1                          | SWICS Lamp @ Level 1                                                       |           |
| 53988         2         SWICS1         SWICS1 intensity Level         3         SWICS1 amp @ Level 3           5397         30         N/A         N/A         N/A         N/A           5397         30         N/A         0         Stow         N/A           5498         2         Short Earth Scan         1         Normal Earth Scan           5497         3         MAM Scan         4         Nadir Scan           4         Noise Test 1         6         Noise Test 1           6         Noise Test 1         6         Noise Test 1           6         Noise Test 1         10         Cal Mode 6           7         Cal Mode 6B         10         Cal Mode 6B           10         Cal Mode 7         11         Cal Mode 7           5         ELSCAN         Elevation Scan Mode         16         Cal Mode 11           14         Cal Mode 11         14         Cal Mode 14         14           5         Normal Earth Scan         2         Short Earth Scan           13         Cal Mode 14         14         Cal Mode 14           5         Noise Test 1         Noise Test 1         Noise Test 1           6         Noise Test 1 <td></td> <td></td> <td></td> <td></td> <td>2</td> <td>SWICS Lamp @ Level 2</td> <td>_</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |             |               |                                     | 2                          | SWICS Lamp @ Level 2                                                       | _         |
| 539/U         30         N/A         N/A         N/A           539/U         30         N/A         Spare         N/A         N/A           1         N/A         N/A         N/A         N/A           2         Shoft Earth Scan         3         MAM Scan           3         MAM Scan         3         MAM Scan           3         MAM Scan         3         MAM Scan           4         Noise Test 1         6         Noise Test 2           6         Noise Test 2         7         Cal Mode 6A           9         Cal Mode 6A         9         Cal Mode 6A           10         Cal Mode 6B         10         Cal Mode 8B           11         Cal Mode 7         11         Cal Mode 8B           12         Cal Mode 7         11         Cal Mode 8B           13         Cal Mode 8B         13         Cal Mode 12           14         Cal Mode 12         Cal Mode 12         Cal Mode 12           13         Cal Mode 12         Cal Mode 12         Cal Mode 12           14         Cal Mode 12         Cal Mode 12         Cal Mode 12           13         Cal Mode 12         Cal Mode 12         Cal Mode 12 </td <td>968</td> <td>2</td> <td>SWICSI</td> <td>SWICS Intensity Level</td> <td>3</td> <td>SWICS Lamp @ Level 3</td> <td>В</td>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 968    | 2           | SWICSI        | SWICS Intensity Level               | 3                          | SWICS Lamp @ Level 3                                                       | В         |
| 54000     5     ELSCAN     Elevation Scan Mode     0     Stow       54000     5     ELSCAN     Elevation Scan Mode     10     Cal Mode 5       54000     5     ELSCAN     Elevation Scan Mode     10     Cal Mode 7       1     1     Cal Mode 68     10     Cal Mode 68       1     1     Cal Mode 7     10       1     1     Cal Mode 7     10       1     Cal Mode 7     10     Cal Mode 7       1     Cal Mode 7     10     Cal Mode 88       1     Cal Mode 7     10     Cal Mode 7       1     Cal Mode 7     10     Cal Mode 11       1     Cal Mode 7     10     Cal Mode 7       1     Cal Mode 7     10     Cal Mode 11       1     Cal Mode 7     10     Cal Mode 7       2     Som 7     Cal Mode 7       3     Cal Mode 7     10       4     Cal Mode 11     14       5     Cal Mode 7     10       6     Noise Test 1     10       7     Cal Mode 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 970    | 30          | N/A           | Spare                               | N/A                        | N/A                                                                        | N/A       |
| 64000       5       ELSCAN       Elevation Scan Mode       1       Normal Earth Scan         64000       5       Noise Test 1       6       Noise Test 2         7       Cal Mode 5       6       Cal Mode 6A         9       Cal Mode 6B       0       Cal Mode 7         11       Cal Mode 7       11       Cal Mode 7         12       Cal Mode 6B       13       Cal Mode 11         13       Cal Mode 12       15       Cal Mode 12         14       Cal Mode 12       15       Cal Mode 14         14       Cal Mode 12       15       Cal Mode 14         15       Cal Mode 14       10       Normal Earth Scan         16       Normal Earth Scan       3       MAM Scan         14       Cal Mode 12       15       Cal Mode 14         15       Cal Mode 14       Normal Earth Scan       3         14       Normal Earth Scan       3       MAM Scan         15       Rot Earth Scan       3       MAM Scan         16       Noise Test 1       Noise Test 1       Noise Test 1         16       Noise Test 2       7       Cal Mode 5       14         10       Cal Mode 6A       9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     | 0                          | Stow                                                                       |           |
| 54000     5     ELSCAN     Elevation Scan Mode     1       54000     5     ELSCAN     Elevation Scan Mode     1       6     Notarth Scan     3       7     Cal Mode 5       7     Cal Mode 6A       8     Cal Mode 6B       11     Cal Mode 6B       12     Cal Mode 6B       13     Cal Mode 6B       14     Cal Mode 6B       15     Cal Mode 7       11     Cal Mode 6B       12     Cal Mode 6B       13     Cal Mode 11       14     Cal Mode 11       15     Cal Mode 11       14     Cal Mode 11       15     Cal Mode 11       14     Cal Mode 11       15     Cal Mode 12       16     Normal Earth Scan       17     Cal Mode 14       18     Cal Mode 14       19     Stow       10     Stow       11     Cal Mode 5A       11     Cal Mode 6A       11     Cal Mode 7       11     Cal Mode 6A       11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |             |               |                                     | 1                          | Normal Earth Scan                                                          |           |
| 54000         5         ELSCAN         Elevation Scan Mode         16-31         MAM Scan           54000         5         ELSCAN         Elevation Scan Mode         16-31         Noise Test 1           54000         5         ELSCAN         Elevation Scan Mode         16-31         Noise Test 2           6         Noise Test 2         7         Cal Mode 6A         9         Cal Mode 7           11         Cal Mode 6A         11         Cal Mode 7         11         Cal Mode 8B           13         Cal Mode 8A         13         Cal Mode 12         2           54000         5         ELSCAN         Elevation Scan Mode         16-31         Not Available           54000         5         ELSCAN         Elevation Scan Mode         16-31         Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     | 2                          | Short Earth Scan                                                           |           |
| 54000         5         ELSCAN         Elevation Scan Mode         6         Noise Test 1           54000         5         ELSCAN         Elevation Scan Mode         10         Cal Mode 6A           5         11         Cal Mode 7         11         Cal Mode 7A           5         ELSCAN         11         Cal Mode 7A         11           54000         5         ELSCAN         12         Cal Mode 7A           54000         5         ELSCAN         13         Cal Mode 7A           54000         5         ELSCAN         Elevation Scan Mode         16           14         Cal Mode 7A         Cal Mode 7A         Cal Mode 7A           54000         5         ELSCAN         Elevation Scan Mode         16           14         Cal Mode 14         14         Cal Mode 14           15         Cal Mode 7A         11         Normal Earth Scan           14         O         Normal Earth Scan         13         MAM Scan           15         Noise Test 1         14         Noise Test 1         14           16         Noise Test 1         15         Noise Test 1         15           16         Noise Test 1         16         Noise Test                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |             |               |                                     | 3                          | MAM Scan                                                                   |           |
| 5         Noise Test 1           7         Cal Mode 5           7         Cal Mode 6A           9         Cal Mode 6B           10         Cal Mode 6B           11         Cal Mode 7           11         Cal Mode 7           11         Cal Mode 7           11         Cal Mode 7           12         Cal Mode 7           13         Cal Mode 11           14         Cal Mode 12           5         Cal Mode 14           15         Cal Mode 14           16-31         Not Available           1         Not Available           1         Noise Test 1           6         Noise Test 1           6         Noise Test 1           6         Noise Test 2           7         Cal Mode 6A           2         Short Earth Scan           2         Short Earth Scan           3         MAM Scan           4         Naidir Scan           6         Noise Test 1           6         Noise Test 2           7         Cal Mode 6A           9         Cal Mode 6A           10         Cal Mode 6A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     | 4                          | Nadir Scan                                                                 |           |
| 54000     5     ELSCAN     Elevation Scan Mode     0     Noise Test 2       54000     5     ELSCAN     Elevation Scan Mode     16-31     Noise Test 2       54000     5     ELSCAN     Elevation Scan Mode     0     Store       54000     5     ELSCAN     Elevation Scan Mode     16-31     Noise Test 2       54000     6     Cal Mode 6B     10     Cal Mode 7       54000     5     ELSCAN     Elevation Scan Mode     16-31     Noise Test 1       54000     6     Noise Test 2     Short Earth Scan     1       54000     7     Cal Mode 6A     2     Short Earth Scan       54000     6     Noise Test 1     1     Cal Mode 6A       6     Noise Test 1     1     1     Cal Mode 6A       7     Cal Mode 6A     1     1     1       6     Noise Test 1     1     1     1       7     Cal Mode 6A     1     1     1       8     Cal Mode 6A     1     1     1       10     Cal Mode 6A     1     1     1       11     Cal Mode 6A     1     1     1       11     Cal Mode 6A     1     1       11     Cal Mode 6A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |               |                                     | 5                          | Noise Test 1                                                               |           |
| 54000       5       ELSCAN       Elevation Scan Mode       1       Cal Mode 6A         54000       5       ELSCAN       Elevation Scan Mode       11       Cal Mode 7         54000       5       ELSCAN       Elevation Scan Mode       16-31       Not Available         54000       6       Staw       11       Cal Mode 7         54000       5       ELSCAN       Elevation Scan Mode       16-31       Not Available         54000       6       Staw       1       Staw       Normal Earth Scan         54000       7       Cal Mode 14       Not Available       10         54000       6       Normal Earth Scan       2       Staw         54000       7       Cal Mode 14       Noise Test 1         54000       8       Cal Mode 5       1         54000       9       Cal Mode 5       2         54000       1       Noise Test 1       1         54000       1       Cal Mode 5       2         54000       1       Cal Mode 6A       2         54000       1       Cal Mode 6A       2         54000       1       Cal Mode 6A       3         5400       11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |             |               |                                     | 7                          | Cal Mode 5                                                                 |           |
| 54000     5     ELSCAN     Elevation Scan Mode     0     Cal Mode 7       54000     5     ELSCAN     10     Cal Mode 8B       54000     5     ELSCAN     13     Cal Mode 11       14     Cal Mode 12     Cal Mode 14       15     Cal Mode 14       16-31     Not Available       1     Normal Earth Scan       2     Short Earth Scan       3     MAM Scan       4     Nadir Scan       5     Cal Mode 6A       6     Noise Test 1       6     Noise Test 2       7     Cal Mode 6A       9     Cal Mode 6A       9     Cal Mode 7       1     Cal Mode 7       1     Noise Test 1       6     Noise Test 2       7     Cal Mode 6A       9     Cal Mode 6A       9     Cal Mode 6A       11     Cal Mode 6A       12     Cal Mode 6A       13     Cal Mode 7       11     Cal Mode 6A       12     Cal Mode 6A       13     Cal Mode 7       14     Cal Mode 7       15     Cal Mode 7       16     Noise Test 2       17     Cal Mode 6A       18     Cal Mode                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |             |               |                                     | 8                          | Cal Mode 5                                                                 |           |
| 5       ELSCAN       Elevation Scan Mode       10       Cal Mode 7         54000       5       ELSCAN       Elevation Scan Mode       12       Cal Mode 8B         64000       5       ELSCAN       Elevation Scan Mode       16       Cal Mode 12         15       Cal Mode 14       Cal Mode 14       Cal Mode 14         16       Not Available       16       Not Available         1       Normal Earth Scan       1       Normal Earth Scan         2       Short Earth Scan       3       MAM Scan         3       MAM Scan       3       MAM Scan         4       Nair Scan       5       Noise Test 1         6       Noise Test 1       6       Noise Test 2         7       Cal Mode 6A       3       Cal Mode 6B         10       Cal Mode 6B       6         11       Cal Mode 6B       6         12       Cal Mode 6B       6         13       Cal Mode 7       7         14       Cal Mode 6B       10       Cal Mode 6B         15       Cal Mode 7       7       Cal Mode 7         16       10       Cal Mode 7       7         15       10       Cal Mo                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |             |               |                                     | 9                          | Cal Mode 6B                                                                |           |
| 54000       5       ELSCAN       Elevation Scan Mode       11       Cal Mode 8A         54000       5       ELSCAN       Elevation Scan Mode       16-31       Not Available         54000       5       ELSCAN       Elevation Scan Mode       0       Stow         6       0       Stow       1       Nort Available         7       Cal Mode 5       3       Madir Scan         8       Cal Mode 6B       3       Mode 5         7       Cal Mode 6B       3       Cal Mode 6B         8       Cal Mode 6B       3       Cal Mode 6B         9       Cal Mode 6B       3       Cal Mode 6B         10       Cal Mode 6B       3       Cal Mode 6B         11       Cal Mode 6B       3       Cal Mode 6B         10       Cal Mode 6B       3       Cal Mode 6B         11       Cal Mode 6B       10       Cal Mode 6B         12       Cal Mode 8B       13       Cal Mode 8B                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |             |               |                                     | 10                         | Cal Mode 7                                                                 |           |
| 54000       5       ELSCAN       Elevation Scan Mode       12       Cal Mode 13         54000       5       ELSCAN       Elevation Scan Mode       16-31       Not Available         54000       5       ELSCAN       Elevation Scan Mode       0       Stow         0       Stow       1       Normal Earth Scan         2       Short Earth Scan       2       Short Earth Scan         3       MAMS scan       4       Nadir Scan         4       Nadir Scan       5       Noise Test 1         5       Noise Test 1       6       Noise Test 2         7       Cal Mode 6A       8       Cal Mode 6A         8       Cal Mode 6A       3         9       Cal Mode 6A       3       11         10       Cal Mode 6A       3       2         11       Cal Mode 6A       3       3         11       Cal Mode 6A       3       3         11       Cal Mode 6A       3       11         12       Cal Mode 7       11       Cal Mode 7         13       Cal Mode 7       13       Cal Mode 7         13       Cal Mode 7       13       13         13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |             |               |                                     | 11                         | Cal Mode 8A                                                                |           |
| 54000       5       ELSCAN       Elevation Scan Mode       13       Cal Mode 11         54000       5       ELSCAN       Elevation Scan Mode       16-31       Not Available         54001       5       ELSCAN       Elevation Scan Mode       0       Stow         1       Normal Earth Scan       2       Short Earth Scan       2         3       MAM Scan       3       MAM Scan         4       Nadir Scan       5       Noise Test 1         5       Noise Test 2       6       Noise Test 2         6       Noise Test 2       7       Cal Mode 6A         7       Cal Mode 6B       9       Cal Mode 6B         10       Cal Mode 6B       10       Cal Mode 6B         11       Cal Mode 7       11       Cal Mode 8A         12       Cal Mode 8B       13       Cal Mode 8B         13       Cal Mode 8B       13       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     | 12                         | Cal Mode 8B                                                                |           |
| 54000       5       ELSCAN       Elevation Scan Mode       14       Cal Mode 12         54000       5       ELSCAN       16-31       Not Available         0       Stow       1       Normal Earth Scan         12       Short Earth Scan       2       Short Earth Scan         3       MAM Scan       4       Naidir Scan         4       Noise Test 1       6       Noise Test 2         7       Cal Mode 5       8       Cal Mode 6A         9       Cal Mode 6B       10       Cal Mode 7         11       Cal Mode 7       11       Cal Mode 7         12       Cal Mode 7       11       Cal Mode 7         13       Cal Mode 7       11       Cal Mode 7         14       Cal Mode 8B       12       Cal Mode 8B         13       Cal Mode 8B       13       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |             |               |                                     | 13                         | Cal Mode 11                                                                |           |
| 54000       5       ELSCAN       Elevation Scan Mode       15       Ccal Mode 14         54000       5       ELSCAN       16-31       Not Available         0       0       Stow         1       Normal Earth Scan       2         3       MAM Scan         4       Natir Scan         4       Natir Scan         5       Other Stow         6       Noise Test 1         66       Noise Test 2         7       Cal Mode 5         8       Cal Mode 6A         9       Cal Mode 6A         10       Cal Mode 7         11       Cal Mode 7         12       Cal Mode 8B         13       Cal Mode 8B         14       Cal Mode 7                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |        |             |               |                                     | 14                         | Cal Mode 12                                                                |           |
| 54000     5     ELSCAN     Elevation Scan Mode     16-31     Not Available       0     0     Stow     1     Normal Earth Scan       1     0     Normal Earth Scan     2       3     MAM Scan     3     MAM Scan       4     Naise Test 1     6       6     Noise Test 2       7     Cal Mode 5       8     Cal Mode 6A       9     Cal Mode 6B       10     Cal Mode 7       11     Cal Mode 8A       12     Cal Mode 8B       13     Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |        |             |               |                                     | 15                         | Cal Mode 14                                                                | _         |
| 0       Stow         1       Normal Earth Scan         2       Bharth Scan         3       MAM Scan         4       Naidir Scan         5       Noise Test 1         6       Noise Test 2         7       Cal Mode 5         8       Cal Mode 6A         9       Cal Mode 6B         10       Cal Mode 7         11       Cal Mode 8A         12       Cal Mode 8B         13       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 000    | 5           | ELSCAN        | Elevation Scan Mode                 | 16-31                      | Not Available                                                              | В         |
| 1       Normal Earth Scan         2       Short Earth Scan         3       MAM Scan         4       Nadir Scan         5       Noise Test 1         6       Noise Test 2         7       Cal Mode 5         8       Cal Mode 6B         9       Cal Mode 6B         10       Cal Mode 7         11       Cal Mode 8A         12       Cal Mode 8B         13       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |             |               |                                     | 0                          | Stow                                                                       |           |
| 2       Short Earth Scan         3       MAM Scan         4       Nadir Scan         5       Noise Test 1         6       Noise Test 2         7       Cal Mode 5         8       Cal Mode 6A         9       Cal Mode 6B         10       Cal Mode 8A         11       Cal Mode 8A         12       Cal Mode 11         14       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |             |               |                                     | 1                          | Normal Earth Scan                                                          |           |
| 3       MAM Scan         4       Nadir Scan         5       Noise Test 1         6       Noise Test 2         7       Cal Mode 5         8       Cal Mode 6A         9       Cal Mode 6B         10       Cal Mode 7         11       Cal Mode 8A         12       Cal Mode 11         14       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |             |               | A V                                 | 2                          | Short Earth Scan                                                           |           |
| 4         Nadir Scan           5         Noise Test 1           6         Noise Test 2           7         Cal Mode 5           8         Cal Mode 6A           9         Cal Mode 6B           10         Cal Mode 7           11         Cal Mode 8A           12         Cal Mode 8B           13         Cal Mode 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |               |                                     | 3                          | MAM Scan                                                                   |           |
| 6         Noise Test 1           7         Cal Mode 5           8         Cal Mode 6A           9         Cal Mode 6B           10         Cal Mode 7           11         Cal Mode 8A           12         Cal Mode 8B           13         Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |               |                                     | 4                          | Nadir Scan                                                                 |           |
| 7     Cal Mode 5       8     Cal Mode 6A       9     Cal Mode 6B       10     Cal Mode 7       11     Cal Mode 8A       12     Cal Mode 8B       13     Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |             |               |                                     | 5                          | Noise Test 7                                                               |           |
| Note of A       B       Cal Mode 6A       9       Cal Mode 6B       10       Cal Mode 7       11       Cal Mode 8A       12       Cal Mode 7       13       Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |             |               |                                     | 7                          | Cal Mode 5                                                                 |           |
| 9 Cal Mode 6B<br>10 Cal Mode 7<br>11 Cal Mode 7<br>11 Cal Mode 8A<br>12 Cal Mode 8B<br>13 Cal Mode 11<br>14 Cal Mode 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |             |               |                                     | 8                          | Cal Mode 6A                                                                |           |
| 10         Cal Mode 7           11         Cal Mode 8A           12         Cal Mode 8B           13         Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |             |               |                                     | 9                          | Cal Mode 6B                                                                |           |
| 11         Cal Mode 8A           12         Cal Mode 8B           13         Cal Mode 11           14         Cal Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |        |             |               |                                     | 10                         | Cal Mode 7                                                                 |           |
| 12 Cal Mode 8B<br>13 Cal Mode 11<br>14 Cal Mode 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |             |               |                                     | 11                         | Cal Mode 8A                                                                |           |
| 13 Cai Mode 11                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |             |               |                                     | 12                         | Cal Mode 8B                                                                |           |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |             |               |                                     | 13                         | Cal Mode 11                                                                |           |
| 14 Car Mode 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |        |             |               |                                     | 14                         | Cal Mode 12                                                                |           |
| 5 DECKELDY Function On Dark Gran Michael 15 Call Mode 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 005    | ~           |               | Elsustian On Dask Open Made         | 15                         | Cal Mode 14                                                                |           |
| 3     DECRETE     Elevation On-Deck Scan Mode     10-31     Not Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 005    | 5           | DECKELEV      | Elevation Un-Deck Scan Mode         | 10-31                      | INOT AVAIIADIE                                                             | В         |

|           |        |               |                                       | Units       | Conversion Coefficients (formula or C5.C4.C3.C2.C1.C0) |           |
|-----------|--------|---------------|---------------------------------------|-------------|--------------------------------------------------------|-----------|
| Start Bit | Bit    | Mnemonic Name | Description                           | OR          | OR                                                     | Data Type |
| otart bit | Size   |               | 2 cost prior                          | State Value | State Name                                             | Data Type |
|           |        |               |                                       | otate value | State Ivanie                                           |           |
|           |        |               |                                       | 0           | Nominal Scan Operation                                 |           |
|           |        |               |                                       | 1           | Initialization In-Progress                             |           |
|           |        |               |                                       | 2           | Elevation @ Initialized Position                       |           |
|           |        |               |                                       | 3           | Scan Abort In-Progress                                 |           |
|           |        |               |                                       | 4           | Elevation @ Aborted Position                           |           |
| 54010     | 3      | FLEVSTAT      | Elevation Status                      | 5-7         | Not Lised                                              | в         |
| 0.010     |        |               |                                       | 0           | Drive Disabled                                         | _         |
| 54013     | 1      | FLMDRV        | Elevation Motor Drive Status          | 1           | Drive Enabled                                          | в         |
| 34013     |        | EEMDIW        |                                       |             | Low Encoder LED Intensity                              | 5         |
| E 404 4   |        |               |                                       | 1           | Low Encoder LED Intensity                              |           |
| 54014     | 1      | ELEVLED       |                                       |             | Righ Encoder LED Intensity                             | D         |
|           |        |               |                                       | 0           | Gimbal Not Stalled                                     |           |
| 54015     | 1      | ELSTALL       | Elevation Stall Indicator             | 1           | Gimbal Stalled                                         | В         |
| 54016     | 16     | ELPOFFC       | Elevation Offset Correction           | deg         |                                                        | N/A       |
| 54032     | 16     | ELSTERR       | Elevation Stall Error Threshold       | Counts      |                                                        | N/A       |
| 54048     | 10     | ELSTCNT       | Elevation Stall Count Threshold       | Counts      |                                                        | N/A       |
| 54058     | 6      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
| 54064     | 16     | ELPERR1       | Elevation Position Error #1           | Counts      |                                                        | N/A       |
| 54080     | 16     | ELPERR2       | Elevation Position Error #2           | Counts      |                                                        | N/A       |
| 54096     | 16     | ELPERR3       | Elevation Position Error #3           | Counts      |                                                        | N/A       |
|           |        |               |                                       | 0           | Stop                                                   |           |
|           |        |               |                                       | 1           | Onen                                                   |           |
|           |        |               |                                       | 2           | Close                                                  |           |
|           |        |               |                                       | 2           | Ciuse<br>Nat Jacob                                     |           |
|           |        |               |                                       | 3           | Final Otan Tananda Onan                                |           |
|           |        |               |                                       | 4           | Fixed Step Towards Open                                |           |
|           |        |               |                                       | 5           | Fixed Step Towards Closed                              |           |
| 54112     | 4      | MAINCCMD      | Main Cover Command                    | 6-15        | Not Used                                               | В         |
|           |        |               |                                       | 0           | Cover Stopped                                          |           |
|           |        |               |                                       | 1           | Cover Opening                                          |           |
|           |        |               |                                       | 2           | Cover Closing                                          |           |
|           |        |               |                                       | 3           | Not Used                                               |           |
|           |        |               |                                       | 4           | Cover Stepping Forward                                 |           |
|           |        |               |                                       | 5           | Cover Stepping Reverse                                 |           |
|           |        |               |                                       | 6-14        | Not Lised                                              |           |
| 54116     | 4      | MAINCOVM      | Main Cover Motion Status              | 15          | Cover Start Moving                                     | в         |
| 34110     | 4      | MAINCOVM      |                                       | 15          | Not @ Opened or Cleased                                | В         |
|           |        |               |                                       | 0           |                                                        |           |
|           |        |               |                                       |             | @ Open                                                 |           |
|           |        |               |                                       | 2           | @ Closed                                               |           |
|           |        |               |                                       | 3           | Not Used                                               |           |
|           |        |               |                                       | 4           | Potential Bad Sensor                                   |           |
| 54120     | 4      | MAINPSTAT     | Main Cover Position Status            | 5-15        | Not Used                                               | В         |
|           |        |               |                                       | 0           | Cover Sensor 1 Active                                  |           |
|           |        |               |                                       | 1           | Cover Sensor 2 Active                                  |           |
| 54124     | 2      | MAINACTS      | Main Cover Active Position Sensor     | 2-3         | Not Used                                               | В         |
| 54126     | 2      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
| 54128     | 12     | MAINCMDP      | Main Cover Commanded Position         | Counts      |                                                        | N/A       |
| 54140     | 4      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
| 54144     | 8      | MAINLAG1      | Main Cover Sensor 1 Accumulated Lag   | Counts      |                                                        | N/A       |
| 5/152     | 8      | N/A           | Snare                                 | N/A         | N/A                                                    | N/A       |
| 54160     | ں<br>ہ | MAINI AG2     | Main Cover Senser 2 Accumulated Lag   | Counto      | N/A                                                    |           |
| 54100     | 0      | WAINLAG2      | Wall Cover Sensor 2 Accumulated Lag   | Courits     | N/A                                                    | N/A       |
| 04168     | 8      |               | Spare                                 | IN/A        | N/A                                                    | N/A       |
| 541/6     | 16     | MAINSTEPC     | Main Cover Step Count                 | Counts      |                                                        | N/A       |
| 54192     | 12     | MAINCLOS      | Main Cover Closed Position Definition | Counts      |                                                        | N/A       |
| 54204     | 4      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
| 54208     | 12     | MAINOPEN      | Main Cover Open Position Definition   | Counts      |                                                        | N/A       |
| 54220     | 4      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
| 54224     | 12     | MAINCMAR      | Main Cover Closed Margin Definition   | Counts      |                                                        | N/A       |
| 54236     | 4      | N/A           | Spare                                 | N/A         | N/A                                                    | N/A       |
|           |        |               |                                       |             |                                                        |           |

## Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

| Start Bit | Bit<br>Size | Mnemonic Name | Description                             | Units<br>OR<br>State Value               | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                        | Data Type |
|-----------|-------------|---------------|-----------------------------------------|------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 54240     | 12          | MAINOMAR      | Main Cover Open Margin Definition       | Counts                                   |                                                                                                                                                   | N/A       |
| 54252     | 4           | N/A           | Spare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54256     | 4           | MAMCCMD       | MAM Cover Command                       | 0<br>1<br>2<br>3<br>4<br>5<br>6-15       | Stop<br>Open<br>Close<br>Not Used<br>Fixed Step Towards Open<br>Fixed Step Towards Closed<br>Not Used                                             | в         |
| 54260     | 4           | MAMCOVM       | MAM Cover Motion Status                 | 0<br>1<br>2<br>3<br>4<br>5<br>6-14<br>15 | Cover Stopped<br>Cover Opening<br>Cover Closing<br>Not Used<br>Cover Stepping Forward<br>Cover Stepping Reverse<br>Not Used<br>Cover Start Moving | В         |
| 54264     | 4           | MAMPSTAT      | MAM Cover Position Status               | 0<br>1<br>2<br>3<br>4<br>5-15            | Not @ Opened or Closed<br>@ Open<br>@ Closed<br>Not Used<br>Potential Bad Sensor<br>Not Used                                                      | В         |
| 54268     | 2           | MAMACTS       | MAM Cover Active Position Sensor        | 1<br>2-3                                 | Cover Sensor 2 Active<br>Not Used                                                                                                                 | в         |
| 54270     | 2           | N/A           | Spare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54272     | 12          | MAMCMDP       | MAM Cover Commanded Position            | Counts                                   |                                                                                                                                                   | N/A       |
| 54284     | 36          | N/A           | Snare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54320     | 16          | MAMSTEPC      | MAM Cover Step Count                    | Counts                                   |                                                                                                                                                   | N/A       |
| 54336     | 12          | MAMCLOS       | MAM Cover Closed Position Definition    | Counts                                   |                                                                                                                                                   | N/A       |
| 54330     | 12          | N/A           | Share                                   | N/A                                      | N/A                                                                                                                                               |           |
| 54340     | 4           | MAMODEN       | MAM Cover Open Besition Definition      | Counto                                   | N/A                                                                                                                                               | N/A       |
| 54352     | 12          | MAMOPEN       |                                         | Counts                                   | N/A                                                                                                                                               | N/A       |
| 54364     | 4           | IN/A          | opare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54368     | 12          | MAMCMAR       | MAM Cover Closed Margin Definition      | Counts                                   |                                                                                                                                                   | N/A       |
| 54380     | 4           | N/A           | Spare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54384     | 12          | MAMOMAR       | MAM Cover Open Margin Definition        | Counts                                   |                                                                                                                                                   | N/A       |
| 54396     | 4           | N/A           | Spare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54400     | 1           | DWDGBOOT      | DAP Processor Boot Status               | 0<br>1                                   | Reset Not bec. W/D Timeout<br>Reset bec. Watchdog Timeout                                                                                         | В         |
| 54401     | 1           | DWDGENBL      | DAP Processor Watchdog Enable Status    | 0<br>1                                   | Disarm Watchdog Timer<br>Arm Watchdog Timer                                                                                                       | В         |
| 1 T       |             | I             |                                         | 0                                        | PROM Power On                                                                                                                                     |           |
| 54402     | 1           | DPROMPWR      | DAP Processor PROM Power Status         | 1                                        | PROM Power Off                                                                                                                                    | В         |
| 54403     | 2           |               | DAP Sample Clock Interrupt Occurred     | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54405     | 11          | N/A           | Spare                                   | N/A                                      | N/A                                                                                                                                               | N/A       |
| 54416     | 16          | DSCANPER      | DAP Processor Scan Period Count         | Counts                                   |                                                                                                                                                   | N/A       |
| 54432     | 16          | DMEMSOFF      | DAP Mem Dump Start Address Offset       | Offset                                   |                                                                                                                                                   | N/A       |
| 54448     | 16          | DMEMSSEG      | DAP Mem Dump Start Address Segment      | Seament                                  |                                                                                                                                                   | N/A       |
| 54464     | 16          | DMEMEOFF      | DAP Mem Dump End Address Offset         | Offset                                   |                                                                                                                                                   | N/A       |
| 54480     | 16          | DMEMESEG      | DAP Mem Dump End Address Segment        | Segment                                  |                                                                                                                                                   | N/A       |
| 54/06     | 16          | DPCKSOFF      | DAP Mem Dump Pickt Start Address Offset | Offeet                                   |                                                                                                                                                   | Ν/Δ       |
| 54512     | 16          | DPCKSSEG      | DAP Mem Dump Pokt Start Address Seg     | Segment                                  |                                                                                                                                                   | N/A       |
| 54528     | 16          |               | DAP Mem Dump Address Changed            | N/A                                      | N/A                                                                                                                                               | N/A       |
| 04020     | 10          |               | DAT Meth Durip Address Changed          | 1 19/75                                  | 1 10/4                                                                                                                                            |           |

| Start Bit | Bit<br>Size           | Mnemonic Name | Description                             | Units<br>OR<br>State Value                                    | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name                                                                                                                                                     | Data Type |
|-----------|-----------------------|---------------|-----------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 54544     | 16                    | DPMINET       | DAP Min Execution Time                  | msec                                                          |                                                                                                                                                                                                                                | N/A       |
| 54560     | 11                    | DPMINESN      | DAP Min Execution Sample Number         | Counts                                                        |                                                                                                                                                                                                                                | N/A       |
| 54571     | 5                     | N/A           | Spare                                   | N/A                                                           | N/A                                                                                                                                                                                                                            | N/A       |
| 54576     | 16                    | DPMAXET       | DAP Max Execution Time                  | msec                                                          |                                                                                                                                                                                                                                | N/A       |
| 54592     | 11                    | DPMAXESN      | DAP Max Execution Sample Number         | Counts                                                        |                                                                                                                                                                                                                                | N/A       |
| 54603     | 5                     | N/A           | Spare                                   | N/A                                                           | N/A                                                                                                                                                                                                                            | N/A       |
| 54608     | 16                    | DCODCKSUM     | DAP RAM Code Checksum                   | N/A                                                           | N/A                                                                                                                                                                                                                            |           |
| 54624     | 16                    | DROMCKSUM     | DAP ROM Checksum                        | N/A                                                           | N/A                                                                                                                                                                                                                            |           |
| 54640     | 80                    | N/A           | Spare                                   | N/A                                                           | N/A                                                                                                                                                                                                                            | N/A       |
|           |                       |               |                                         | 0<br>1<br>2<br>3<br>4<br>5<br>6<br>7<br>8<br>9<br>10<br>11 15 | Go to Crosstrack<br>Go to Position A<br>Go to Position B<br>Go to Solar Calibration Angle<br>Go to Spare Position 1<br>Go to Spare Position 2<br>Go to Spare Position 3<br>Scan A to B Asynchronous<br>Scan A to B Synchronous |           |
| 54720     | 5 AZMODE Azimuth Mode |               | 11-15<br>16-31                          | Not Osed<br>Not Available                                     | в                                                                                                                                                                                                                              |           |
| 54725     | 1                     | AZMOT         | OT Azimuth Motion Status                |                                                               | Stopped<br>Moving                                                                                                                                                                                                              | В         |
| 54726     | 1                     | AZDIR         | Azimuth Direction Status                | 0<br>1                                                        | Forward<br>Reverse                                                                                                                                                                                                             | в         |
| 54727     | 4                     | AZPOSSTAT     | Azimuth Position Status                 | 0<br>1<br>2<br>3<br>4<br>5-15                                 | At Go to Position<br>At Stopped<br>At Initial Position<br>At Scan Position<br>In Motion<br>Not Used                                                                                                                            | в         |
| 54704     |                       |               | Animuth Mater Drive Status              | 0                                                             | Drive Disabled                                                                                                                                                                                                                 |           |
| 04731     | -                     | AZMDIN        | Azilibili Motor Dive Status             | 0                                                             | Low Encoder LED Intensity                                                                                                                                                                                                      | В         |
| 54732     | 1                     | AZLED         | Azimuth Encoder LED Level               | 1                                                             | High Encoder LED Intensity                                                                                                                                                                                                     | В         |
|           |                       |               |                                         | 0                                                             | Gimbal Not Stalled                                                                                                                                                                                                             | _         |
| 54/33     | 1                     | AZSTALL       | Azimuth Stall Indicator                 |                                                               | Gimbal Stalled                                                                                                                                                                                                                 | В         |
| 54/34     | 2                     | N/A           | Spare<br>Crosstrack Basilian Definition | N/A<br>dor                                                    | N/A                                                                                                                                                                                                                            | N/A       |
| 54750     | 10                    |               | Position A Definition                   | deg                                                           |                                                                                                                                                                                                                                | IN/A      |
| 54768     | 16                    |               | Position B Definition                   | deg                                                           |                                                                                                                                                                                                                                | N/A       |
| 54784     | 16                    | A7FIX3        | Solar Cal Position Definition           | deg                                                           |                                                                                                                                                                                                                                | N/A       |
| 54800     | 16                    | AZEIXA        | Az Cage Position Definition             | deg                                                           |                                                                                                                                                                                                                                | N/A       |
| 54816     | 16                    | AZEIX5        | Spare Az Position Definition #1         | deg                                                           |                                                                                                                                                                                                                                | N/A       |
| 54832     | 16                    | AZFIX6        | Spare Az Position Definition #2         | dea                                                           |                                                                                                                                                                                                                                | N/A       |
| 54848     | 16                    | AZFIX7        | Spare Az Position Definition #3         | dea                                                           |                                                                                                                                                                                                                                | N/A       |
| 54864     | 16                    | AZRATE0       | Normal (GOTO) AZ Rate Definition        | deg/sec                                                       |                                                                                                                                                                                                                                | N/A       |
| 54880     | 16                    | AZRATE1       | Unsync AZ Scan Rate Definition          | deg/sec                                                       |                                                                                                                                                                                                                                | N/A       |
| 54896     | 16                    | AZRATE2       | Sync AZ Scan Rate Definition            | deg/sec                                                       |                                                                                                                                                                                                                                | N/A       |
| 54912     | 16                    | AZCORR        | Azimuth Offset Correction               | deg                                                           |                                                                                                                                                                                                                                | N/A       |
| 54928     | 16                    | AZSTERR       | Azimuth Stall Error Threshold           | Counts                                                        |                                                                                                                                                                                                                                | N/A       |
|           |                       |               |                                         |                                                               |                                                                                                                                                                                                                                |           |
| 54944     | 10                    | AZSTCNT       | Azimuth Stall Count Threshold           | Counts                                                        |                                                                                                                                                                                                                                | N/A       |

| _         |      |               |                                    |             |                                                        |           |
|-----------|------|---------------|------------------------------------|-------------|--------------------------------------------------------|-----------|
|           |      |               |                                    | Units       | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0) |           |
| Start Bit | Bit  | Mnemonic Name | Description                        | OR          | OR                                                     | Data Type |
|           | Size |               | ·                                  | State Value | State Name                                             |           |
|           |      |               |                                    | 0           | Stop                                                   | -         |
|           |      |               |                                    | 1           | Cage                                                   |           |
|           |      |               |                                    | 2           | Apply                                                  |           |
|           |      |               |                                    | 3           | Release                                                |           |
|           |      |               |                                    | 4           | Fixed Step Towards Cage                                |           |
|           |      |               |                                    | 5           | Fixed Step Towards Applied                             |           |
| 54960     | 4    | BRAKECMD      | Brake Command Status               | 6-15        | Not Used                                               | В         |
|           |      |               |                                    | 0           | Stopped                                                |           |
|           |      |               |                                    | 1           | Caging                                                 |           |
|           |      |               |                                    | 2           | Applying                                               |           |
|           |      |               |                                    | 3           | Releasing                                              |           |
|           |      |               |                                    | 4           | Forward Stepping                                       |           |
|           |      |               |                                    | 5           | Reverse Stepping                                       |           |
|           |      |               |                                    | 6-14        | Not Used                                               |           |
| 54964     | 4    | BRAKEMOT      | Brake Motion Status                | 15          | Start Moving                                           | В         |
|           |      |               |                                    | 0           | Not @ Relessd, Appld or Caged                          |           |
|           |      |               |                                    | 1           | @ Caged                                                |           |
|           |      |               |                                    | 2           | @ Applied                                              |           |
|           |      |               |                                    | 3           | @ Released                                             |           |
|           |      |               |                                    | 4           | Potential Bad Position Sensor                          |           |
| 54968     | 4    | BRAKEPOS      | Brake Position Status              | 5-15        | Not Used                                               | В         |
| 54972     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 54976     | 12   | BRKCMDPS      | Brake Commanded Position           | Counts      |                                                        | N/A       |
| 54988     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 54992     | 12   | BRKCURPS      | Brake Current Position             | Counts      |                                                        | N/A       |
| 55004     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55008     | 8    | BRKPSMUX      | Brake Position Submux Channel      | N/A         | N/A                                                    | N/A       |
| 55016     | 8    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55024     | 16   | BRKSCNT       | Brake Step Count                   | Counts      |                                                        | N/A       |
| 55040     | 12   | BRKRELEA      | Brake Released Position Definition | Counts      |                                                        | N/A       |
| 55052     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55056     | 12   | BRKAPPLY      | Brake Applied Position Definition  | Counts      |                                                        | N/A       |
| 55068     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55072     | 12   | BRKCAGED      | Brake Caged Position Definition    | Counts      |                                                        | N/A       |
| 55084     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55088     | 12   | BRKRMAR       | Brake Released Margin              | Counts      |                                                        | N/A       |
| 55100     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55104     | 12   | BRKAMAR       | Brake Applied Margin               | Counts      |                                                        | N/A       |
| 55116     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55120     | 12   | BRKCMAR       | Brake Caged Margin                 | Counts      |                                                        | N/A       |
| 55132     | 4    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
| 55136     | 16   | AZPERR        | Azimuth Position Error             | Counts      |                                                        | N/A       |
| 55152     | 5    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |
|           |      | 7155110       |                                    | 0           | Bus A Selected                                         |           |
| 55157     | 1    | TMFBUS        | I ime Mark & Frequency Bus Select  | 1           | Bus B Selected                                         | В         |
|           |      |               | The Made & Francisco Internet      | 0           | No Lime Mark & Freq Interrupt                          |           |
| 55158     | 1    |               | I ime Mark & Frequency Interrupt   | 1           | I M & Freq Interrupt Occurred                          | B B       |
| 55159     | Э    | N/A           | Spare                              | N/A         | N/A                                                    | N/A       |

|           |          |               |                                       | Units         | Conversion Coefficients (formula or C5.C4.C3.C2.C1.C0) |           |
|-----------|----------|---------------|---------------------------------------|---------------|--------------------------------------------------------|-----------|
| Start Bit | Bit      | Mnemonic Name | Description                           | OR            | OR                                                     | Data Type |
|           | Size     |               |                                       | State Value   | State Name                                             |           |
|           |          |               |                                       | 0             | Boost Not hop W/D Timpout                              |           |
| 55169     | 1        |               | ICP Processor Boot Status             | 1             | Reset hec. Watchdog Timeout                            | в         |
| 33100     | 1        | INDEBOOT      |                                       | <u> </u>      | Disarm Watchdog Timer                                  |           |
| 55160     | 1        | IWDGENBI      | ICP Processor Watchdog Enable Status  | 1             | Arm Watchdog Timer                                     | в         |
| 33103     | - '      | MUDGENDE      |                                       | 0             | PROM Power On                                          |           |
| 55170     | 1        |               | ICP Processor PROM Power Status       | 1             | PROM Power Off                                         | в         |
| 55170     | 2        |               |                                       | N/A           | N/A                                                    | N/A       |
| 33171     | 2        |               |                                       |               | DMA Communication OK                                   | 11/7      |
|           |          |               |                                       |               | DMA Transmit Timed Out                                 |           |
|           |          |               |                                       | 2             | DMA Receive Timed Out                                  |           |
|           |          |               |                                       | 2             | Sample Numbers Out of Sync                             |           |
| 65172     | 2        | COMMETAT      | DMA Communication Status              | 47            | Net Llood (TRMM only)                                  | Б         |
| 55175     | <u> </u> | CONNISTAT     | DMA Communication Status              | 4-7           |                                                        |           |
| 55170     | 0        |               | Spale                                 | N/A<br>Counto | N/A                                                    | N/A       |
| 55104     | 10       | INEMSOLE      | ICP Processor Scan Period Count       | Offeet        |                                                        | N/A       |
| 55200     | 10       |               | ICP Mem Dump Start Address Onset      | Cormont       |                                                        | N/A       |
| 55210     | 10       | INIEINISSEG   | ICP Mem Dump Start Address Segment    | Offeet        |                                                        | N/A       |
| 55232     | 16       | IMEMEOFF      | ICP Mem Dump End Address Onset        | Offset        |                                                        | N/A       |
| 55248     | 16       | IMEMESEG      | ICP Mem Dump End Address Segment      | Segment       |                                                        | N/A       |
| 55264     | 16       | IPCKSOFF      | ICP Wem Dump Pokt Start Address Onset | Offset        |                                                        | N/A       |
| 55280     | 16       | IPCKSSEG      | ICP Mem Dump Pckt Start Address Seg.  | Segment       | A1/A                                                   | N/A       |
| 55296     | 16       |               | ICP Mem Dump Address Changed          | N/A           | N/A                                                    |           |
| 55312     | 16       | IPMINET       |                                       | msec          |                                                        | N/A       |
| 55328     | 11       | IPMINESN      | ICP Min Execution Sample Number       | Counts        |                                                        | N/A       |
| 55339     | 5        | N/A           | Spare                                 | N/A           | N/A                                                    | N/A       |
| 55344     | 16       | IPMAXEI       | ICP Max Execution Time                | msec          |                                                        | N/A       |
| 55360     | 11       | IPMAXESN      | ICP Max Execution Sample Number       | Counts        |                                                        | N/A       |
| 55371     | 5        | N/A           | Spare                                 | N/A           | N/A                                                    | N/A       |
| 55376     | 16       | ICODCKSUM     | ICP RAM Code Checksum                 | N/A           | N/A                                                    | N/A       |
| 55392     | 16       | IROMCKSUM     | ICP ROM Checksum                      | N/A           | N/A                                                    | N/A       |
| 55408     | 80       | N/A           | Spare                                 | N/A           | N/A                                                    | N/A       |
|           |          |               |                                       | 0             | Sun is Not Present                                     | _         |
| 55488     | 1        | SPS1STAT      | SPS 1 Sun Presence State              | 1             | Sun is Present                                         | В         |
|           |          |               |                                       | 0             | Sun is Not Present                                     | _         |
| 55489     | 1        | SPS2STAT      | SPS 2 Sun Presence State              | 1             | Sun is Present                                         | В         |
|           |          |               |                                       | 0             | Solar Pres Response Disabled                           |           |
| 55490     | 1        | SPS1RESP      | SPS 1 Sun Presence Response           | 1             | Solar Pres Response Enabled                            | В         |
|           |          |               |                                       | 0             | Solar Pres Response Disabled                           |           |
| 55491     | 1        | SPS2RESP      | SPS 2 Sun Presence Response           | 1             | Solar Pres Response Enabled                            | В         |
|           |          |               |                                       | 0             | Solar Warning Not Issued                               |           |
|           |          |               |                                       | 1             | Solar Warning Issued                                   |           |
| 55492     | 2        | SOLWARN       | Solar Warning Status                  | 2-3           | Unused                                                 | В         |
|           |          |               |                                       | 0             | Scan T/O Response Disabled                             |           |
| 55494     | 1        | STOUTRSP      | Scan Timeout Response                 | 1             | Scan T/O Response Enabled                              | В         |
|           |          |               |                                       | 0             | Scan T/O Not Actively Counting                         |           |
|           |          |               |                                       | 1             | Scan T/O Actively Counting                             |           |
| 55495     | 2        | STOUTAC       | Scan Timeout Actively Counting        | 2-3           | Unused                                                 | В         |
|           |          |               |                                       | 0             | No Scan Timeout                                        |           |
|           |          |               |                                       | 1             | Scan Timeout Occurred                                  |           |
| 55497     | 2        | STOUTOCC      | Scan Timeout Occurred                 | 2-3           | Unused                                                 | В         |
| 55499     | 5        | N/A           | Spare                                 | N/A           | N/A                                                    | N/A       |
| 55504     | 16       | SWRNSMPL      | Solar Warning Event Sample            | Counts        |                                                        | N/A       |
| 55520     | 16       | SWRNSCAN      | Solar Warning Event Scan Period       | Counts        |                                                        | N/A       |
| 55536     | 16       | STOUTSCN      | Scan Timeout Scan Period              | Counts        |                                                        | N/A       |

## Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

|           |      |                 |                                  | Units          | Conversion Coefficients (formula or C5 C4 C3 C2 C1 C0) |           |
|-----------|------|-----------------|----------------------------------|----------------|--------------------------------------------------------|-----------|
| Start Bit | Bit  | Mnemonic Name   | Description                      | OR             |                                                        | Data Type |
| otart bit | Size |                 | Beeenplien                       | State Value    | State Name                                             | Data Type |
|           |      |                 |                                  |                |                                                        |           |
| 55552     | 12   | SPSS1           | SPS 1 Narrow (Signal) Output     | Counts         |                                                        | N/A       |
| 55564     | 4    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55568     | 12   | SPS11           | SPS 1 Wide (Threshold) Output    | Counts         |                                                        | N/A       |
| 55580     | 4    |                 | Spare                            | N/A            | N/A                                                    | N/A       |
| 55584     | 12   | SPSTINO         | SPS 1 Noise Threshold            | Counts         | 274                                                    | N/A       |
| 55596     | 4    |                 | Spare<br>OPO 4 Datia Threadadd   | N/A            | N/A                                                    | N/A       |
| 55600     | 6    | SPS1INUM        | SPS 1 Ratio Threshold            | Counts         | NIA                                                    | N/A       |
| 55606     | 10   | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55040     |      | 00010570        | OPO 4 Oslar Datastian Otata      | 0              | Sun Not Detected                                       | D.        |
| 55616     | 1    | SPSIDETS        | SPS 1 Solar Detection State      |                | Sun Detected                                           | В         |
| 55617     | 15   | N/A             | Spare<br>OB0.4 Detection Occurt  | N/A            | N/A                                                    | N/A       |
| 55632     | 10   | SPSIDETC        | SPS 1 Detection Count            | Counts         | 61/A                                                   | N/A       |
| 55642     | 6    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55648     | 10   | SPSICNIT        | SPS 1 Count Threshold            | Counts         | <b>N</b> 1/A                                           | N/A       |
| 55658     | 6    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55664     | 10   | SPSTMAXC        | SPS 1 Max Det Count During Scan  | Counts         | <b>N</b> 1/A                                           | N/A       |
| 55674     | 6    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55680     | 12   | 5P552           | SPS 2 Narrow (Signal) Output     | Counts         | 81/4                                                   | N/A       |
| 55692     | 4    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55696     | 12   | SPS12           | SPS 2 Wide (Threshold) Output    | Counts         | <b>N</b> 1/A                                           | N/A       |
| 55708     | 4    |                 | Spare                            |                | N/A                                                    | N/A       |
| 55/12     | 12   | SPSZINUI        | SPS 2 Noise Threshold            | Counts         | 81/4                                                   | N/A       |
| 55724     | 4    |                 | Spare<br>ODO 0 Datia Threadaid   | N/A            | N/A                                                    | N/A       |
| 55724     | 10   | SP32TNUM<br>N/A | SPS 2 Ratio Threshold            | Counts<br>N/A  | NI/A                                                   | N/A       |
| 55734     | 10   | IN/A            | Spare                            | N/A            | N/A<br>Sun Nat Datastad                                | N/A       |
| 65744     | 1    | SPEEDETS        | SDS 2 Salar Detection State      | 1              | Sun Not Detected                                       | в         |
| 55744     | 15   | SF32DE13        | SF3 2 Solar Delection State      | NI/A           | Sun Delected                                           | D NI/A    |
| 55760     | 10   |                 | SPS 2 Detection Count            | IN/A<br>Counto | N/A                                                    | N/A       |
| 55760     | 10   | SF32DETC        | Spara                            | N/A            | N/A                                                    | N/A       |
| 55776     | 10   |                 | SPS 2 Count Threshold            | Counte         | N/A                                                    | N/A       |
| 55796     | 6    | N/A             | Si Si Z Codilit Tilleshold       | N/A            | N/A                                                    | N/A       |
| 55702     | 10   | SPS2MAXC        | SPS 2 Max Det Count During Scan  | Counte         | N/A                                                    | N/A       |
| 55902     | 6    |                 | Si S 2 Max Det Count During Scan | N/A            | NI/A                                                   | N/A       |
| 55808     | 10   | SONTINIT        | Scan Count Initial               | Counte         | N/A                                                    | N/A       |
| 55818     | 6    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 55824     | 10   | SCNTCRNT        | Scan Count Current               | Counts         | N/A                                                    | N/A       |
| 55834     | 6    | N/A             | Spare                            | N/A            | N/A                                                    | N/A       |
| 00004     | 0    | IN/A            | Spare                            | IN/A           | IN/A                                                   | N/A       |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |
|           |      |                 |                                  |                |                                                        |           |

#### Table 4.5.5 CERES Diagnostic Packet User Data Fields (con't)

#### 4.6 SPACECRAFT

#### 4.6.1 Introduction

Generally, the data the Spacecraft bus generates is not considered mission data. Its housekeeping telemetry is transmitted over the narrowband data link. Thus it is documented in the C&T Handbook and not here in the MDFCB. There are two exceptions.

One exception is a fill packet the spacecraft generates to ensure that small instrument memory dumps are transmitted completely and expeditiously. This packet with fixed content can be commanded into APIDs 100 to 131, one at any given time. A combination of factors makes this packet necessary. Because only complete frames are transmitted and because packets can span frames, it is possible for the end of a packet to be in an incomplete frame. For packet types output frequently, the next packet generated will fill the frame and make it ready for transmission. But since memory dumps occur infrequently, the end of memory dump packet may remain in an incomplete frame for a significant time. The same is true of other packet types. The spacecraft fill packet fixes this. Each virtual channel has a fill packet with a unique APID to fill its incomplete frames.

The second spacecraft packet included in the MDFCB is the Attitude and Ephemeris packet whose data are required to geolocate the science data. A description of the science data is incomplete and meaningless if the attitude and ephemeris data are not included.

#### 4.6.2 Instrument Function

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N/A

#### 4.6.3 Modes and Packet Structure

The modes of the spacecraft and observatory are described in Section 3.2. Table 4.6.1 is similar to the tables in previous sections, showing the fill packet APID, VCID, data rate and packet size. In this case, the data rate is listed by instrument mode, not the spacecraft mode.

Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

| VC<br>ID | APID <sub>10</sub> | Telemetry Packet<br>Name      | Data Rate (bps) by<br>Mode   | Downlink     |                       | Packet<br>Size |
|----------|--------------------|-------------------------------|------------------------------|--------------|-----------------------|----------------|
|          |                    |                               | Operational or<br>Diagnostic | HRD          | SMD                   | (octets)       |
| 0        | 11                 | Ephemeris/Attitude<br>Message | 568                          | $\checkmark$ | ~                     | 71             |
| 0        | 100                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ | $\checkmark$          | 2055           |
| 1        | 101                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ | $\checkmark$          | 2055           |
| 2        | 102                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 3        | 103                | S/C Test / Fill Packet        | 164,400                      |              | <ul> <li>✓</li> </ul> | 2055           |
| 4        | 104                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ |                       | 2055           |
| 5        | 105                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 6        | 106                | S/C Test / Fill Packet        | 164,400                      | ✓            |                       | 2055           |
| 7        | 107                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 8        | 108                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 9        | 109                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ |                       | 2055           |
| 10       | 110                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 11       | 111                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ | $\checkmark$          | 2055           |
| 12       | 112                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 13       | 113                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 14       | 114                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ |                       | 2055           |
| 15       | 115                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 16       | 116                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ | $\checkmark$          | 2055           |
| 17       | 117                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 18       | 118                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 19       | 119                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ |                       | 2055           |
| 20       | 120                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 21       | 121                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 22       | 122                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 23       | 123                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ | $\checkmark$          | 2055           |
| 24       | 124                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 25       | 125                | S/C Test / Fill Packet        | 164,400                      |              | $\checkmark$          | 2055           |
| 26       | 126                | S/C Test / Fill Packet        | 164,400                      | $\checkmark$ |                       | 2055           |
| 27       | 127                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 28       | 128                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 29       | 129                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 30       | 130                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |
| 31       | 131                | S/C Test / Fill Packet        | 164,400                      |              |                       | 2055           |

| Table 4.6.1 | Spacecraft | Mission | Data | Packet | Types |
|-------------|------------|---------|------|--------|-------|
|-------------|------------|---------|------|--------|-------|

## 4.6.4 Mission Data

All fields in the spacecraft mission data packets documented below are big endian.

#### 4.6.4.1 Test / Fill Packet

The spacecraft generates Test / Fill packets (APID 100-131) at a 10 Hz rate when enabled. A command to the satellite is necessary to enable or disable generation of a given Test/Fill packet. Only one Test/Fill packet (i.e. single APID) can be enabled at a time. APID 121 is expected to be enabled during instrument memory dumps. APIDs 100-131 do not have a secondary header. The packet size is 2055 bytes. The structure of APIDs 100-131 are identical and are shown in Figure 4.6-1. Since the

content of the Test / Fill packet is a fixed pattern that does not need to be interpreted, there is no User Data Field Table.





#### 4.6.4.2 Attitude and Ephemeris Packet

The spacecraft generates one Attitude and Ephemeris packet (APID 11) every second. Each packet contains a time field for the position and velocity coordinates of the satellite in Earth-Centered, Earth-Fixed reference frame and a time field for the attitude quaternions. The packets are 71 bytes fixed length. The packet structure is shown in Figure 4.6-2 Spacecraft Attitude & Ephemeris Packet Format. The user data fields are listed in Table 4.6.2.



Figure 4.6-2 Spacecraft Attitude & Ephemeris Packet Format

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Check the NPP CCR website at https://cicero.eos.nasa.gov/npp to verify that this Is the correct version prior to use.

| Table 4.6.2 Spacecr | aft Attitude & I | Ephemeris P | Packet User | Data Fields |
|---------------------|------------------|-------------|-------------|-------------|
|---------------------|------------------|-------------|-------------|-------------|

| Start Bit | Bit<br>Size | Mnemonic Name | Description                                               | Units<br>OR<br>State Value | Conversion Coefficients (formula or C5,C4,C3,C2,C1,C0)<br>OR<br>State Name | Data Type |
|-----------|-------------|---------------|-----------------------------------------------------------|----------------------------|----------------------------------------------------------------------------|-----------|
| 0         | 8           | N/A           | Spacecraft ID                                             | N/A                        | N/A                                                                        | U         |
| 8         | 16          | N/A           | Ephemeris Valid Time, Days Since 1/1/1958                 | N/A                        | N/A                                                                        | U         |
| 24        | 32          | N/A           | Ephemeris Valid Time, Milliseconds of Day                 | N/A                        | N/A                                                                        | U         |
| 56        | 16          | N/A           | Ephemeris Valid Time, Microseconds of Milliseconds        | N/A                        | N/A                                                                        | U         |
| 72        | 32          | N/A           | Ephemeris Position (ECEF) X                               | m                          | N/A                                                                        | F         |
| 104       | 32          | N/A           | Ephemeris Position (ECEF) Y                               | m                          | N/A                                                                        | F         |
| 136       | 32          | N/A           | Ephemeris Position (ECEF) Z                               |                            | N/A                                                                        | F         |
| 168       | 32          | N/A           | Ephemeris Velocity (ECEF) X                               |                            | N/A                                                                        | F         |
| 200       | 32          | N/A           | Ephemeris Velocity (ECEF) Y                               | m/s                        | N/A                                                                        | F         |
| 232       | 32          | N/A           | Ephemeris Velocity (ECEF) Z                               | m/s                        | N/A                                                                        | F         |
| 264       | 16          | N/A           | Attitude Valid Time, Days Since 1/1/1958                  | N/A                        | N/A                                                                        | U         |
| 280       | 32          | N/A           | Attitude Valid Time, Milliseconds of Day                  | N/A                        | N/A                                                                        | U         |
| 312       | 16          | N/A           | Attitude Valid Time, Microseconds of Milliseconds N/A N/A |                            | U                                                                          |           |
| 328       | 32          | N/A           | Control Frame Attitude Q1 N/A N/A                         |                            | F                                                                          |           |
| 360       | 32          | N/A           | Control Frame Attitude Q2                                 | N/A                        | N/A                                                                        | F         |
| 392       | 32          | N/A           | Control Frame Attitude Q3                                 | N/A                        | N/A                                                                        | F         |
| 424       | 32          | N/A           | Control Frame Attitude Q4                                 | N/A                        | N/A                                                                        | F         |

#### 5.0 ACRONYMS AND ABBREVIATIONS

| μsec | microsecond |
|------|-------------|
|      |             |

| -A-<br>A/D<br>ACA<br>ADC<br>ADC<br>ADCS<br>APID<br>ASP<br>ATMS<br>A-to-D                                                                                | Analog to Digital<br>Azimuth Control Assembly<br>Analog to Digital Converter<br>Analog-to-digital Converter<br>Attitude Determination and Control System<br>Application Process Identifier<br>Analog Signal Processor<br>Advanced Technology Microwave Sounder<br>Analog to Digital                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>-B-</b><br>BATC<br>BB<br>BCP<br>bps<br>Bps<br>BSA                                                                                                    | Ball Aerospace & Technologies Corp.<br>Black Body<br>Ball Commercial Platform<br>Bits per seconds<br>Bytes per Second<br>Biaxial Scan Assembly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| -C-<br>C&T<br>C3S<br>CADU<br>CBIT<br>CCA<br>CCD<br>CCSDS<br>CDP<br>CDRL<br>CERES<br>CMD<br>CMLB<br>cPCI<br>CPU<br>CrIMSS<br>CrIS<br>CSO<br>CSS<br>CVCDU | Command and Telemetry<br>Command, Control and Communications Segment<br>Channel Access Data Unit<br>Continuous Built-In Test<br>Circuit Card Assembly<br>Charged Coupled Device<br>Consultative Committee for Space Data Systems<br>Command and Data Processor<br>Contract Data Requirements List<br>Clouds and Earth's Radiant Energy System<br>Command<br>Ceramic Multi-Layered Board<br>Compact Peripheral Component Interface<br>Central Processing Unit<br>Cross-track Infrared and Microwave Sounding Suite<br>Cross-track Infrared sounder<br>Cavity Stabilized Oscillator<br>Coarse Sun Sensor<br>Coded Virtual Channel Data Unit |
| <b>-D-</b><br>DA<br>DAA<br>DAP<br>DCA                                                                                                                   | Dynamic Alignment<br>Data Acquisition Assembly<br>Data Acquisition Processor<br>Data Acquisition Converter Assembly                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

Dec Decimal (base 10)

| DF<br>DFB<br>DID<br>DMA<br>DMP<br>DN<br>DNB<br>DOY<br>DPLX<br>DPP<br>DSP<br>DTU<br>DWL | Data Format<br>Distributed Feedback<br>Data Item Description<br>Direct Memory Access<br>Dump<br>Digital Number<br>Day Night Band<br>Day of Year<br>Duplex<br>Digital Preprocessor<br>Digital Signal Processor<br>Digital Telemetry Unit<br>Dwell |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -E-<br>ECA<br>EDR<br>EEPROM<br>EMI<br>Engr<br>EOS<br>EPM                               | Elevation Control Assembly<br>Environmental Data Record<br>Electronically Erasable Programmable Read Only Memory<br>Electromagnetic Interference<br>Engineering<br>Earth Observing System<br>Earth-Pointing Mode                                 |
| <b>-F-</b><br>FIR<br>FOR<br>FOV<br>FPA<br>FPGA<br>FSW<br>FTS                           | Finite Impulse Response<br>Field of Regard<br>Field of View<br>Focal Plane Array<br>Field Programmable Gate Array<br>Flight Software<br>Fourier Transform Spectrometer                                                                           |
| - <b>G</b> -<br>GDO<br>GHz<br>GPS<br>GSFC                                              | Gunn Diode Oscillator<br>gigahertz<br>Global Positioning System<br>Goddard Space Flight Center                                                                                                                                                   |
| -H-<br>Hex<br>HgCdTe<br>HK<br>HKPG<br>HOP<br>HRD<br>HSK, Hskp<br>HW<br>Hz              | Hexadecimal (base 16)<br>Mercury Cadmium Telluride<br>Housekeeping<br>Housekeeping<br>High Output Paraffin<br>High-Rate Data<br>Housekeeping<br>Hardware<br>Hertz (not the rental cars)                                                          |
| <b>-I-</b><br>I/O                                                                      | Input/Output                                                                                                                                                                                                                                     |

| IBIT<br>ICD<br>ICM<br>ICP<br>ICSBB<br>ICT<br>ID<br>IDPS<br>IE<br>IFC<br>IFCV<br>ILS<br>IM<br>IOC<br>IPO<br>IR<br>IRD<br>IRU | Initiated Built-in Test<br>Interface Control Document<br>Instrument Calibration Module<br>Instrument Control Processor<br>Internal Calibration Source Blackbody<br>Internal Calibration Target<br>Identifier<br>Interface Data Processing Segment<br>Interface Data Processing Segment<br>Interface<br>Instrument Flight Computer<br>Instrument Flight Computer<br>Instrument Flight Computer<br>Instrument Line Shape<br>Interferometer Module<br>In-orbit Checkout<br>Integrated Program Office<br>Infrared<br>Interface Requirements Document<br>Inertial Reference Unit |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>-J-</b><br>JFET                                                                                                          | Junction Field Effect Transistor                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>-K-</b><br>KAV<br>KAV_WL<br>kb<br>kB<br>kib<br>Kib/s<br>km                                                               | Ka and V Bands<br>Ka and V Bands Warm Load (Calibration Target)<br>kilobit<br>kilobyte<br>decimal kilobit (1000 bits)<br>kilobits per second<br>kilometer                                                                                                                                                                                                                                                                                                                                                                                                                   |
| -L-<br>LEO&A<br>LEO&A<br>LGS<br>LPC<br>LPL<br>LPS<br>LRD<br>LSB<br>LSW<br>LVDS<br>LW<br>LWIR                                | Light Emitting Diode<br>Launch, Early Orbit & Acquisition<br>Launch, Early Orbit & Anomaly<br>Low Gain Setting<br>Limb Profiler Calibration<br>Limb Profiler Long<br>Limb Profiler Short<br>Low-Rate Data<br>Least Significant Byte<br>Least Significant Byte<br>Least Significant Word<br>Low Voltage Differential Signaling<br>Longwave<br>Long Wave Infrared                                                                                                                                                                                                             |
| <b>-M-</b><br>M_PDU<br>MAM                                                                                                  | Multiplexing Protocol Data Unit<br>Mirror Attenuator Mosaic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

Mb Megabit

APPROVALOUT

| Vbps   | Megabits per second                           |
|--------|-----------------------------------------------|
| MBps   | Megabytes per second                          |
| VBytes | Megabytes                                     |
| MCT    | Mercury Cadmium Telluride                     |
| MDF    | Mission Data Formatter                        |
| MEB    | Main Electronics Box                          |
| MGS    | Medium Gain Setting                           |
| MHz    | Megahertz                                     |
| MLI    | Multilayer Insulation                         |
| MMC    | Mission Management Center                     |
| MPD    | Maximum Path Difference                       |
| MPM    | Mission-Pointing Mode                         |
| MSB    | Most Significant Byte (or bit)                |
| nsec   | millisecond                                   |
| MSW    | Most Significant Word                         |
| MUX    | Multiplexer                                   |
| MWIR   | Mid-wave Infrared                             |
| -N-    |                                               |
| N/A    | Not Applicable                                |
| NASA   | National Aeronautics and Space Administration |
| NEdT   | Noise Equivalent Spectral Radiance            |

| NEGI | Noise Equivalent Spectral Radiance  |
|------|-------------------------------------|
| NGES | Northrop-Grumman Electronic Systems |

|      |           | ••••••••••••••••••••••••••••••••••••••• |         |           |
|------|-----------|-----------------------------------------|---------|-----------|
| NGST | Northrop- | Grumman                                 | Space T | echnology |

|    | •          |
|----|------------|
| nm | Nanometers |

NP Nadir Profile

NPC Nadir Profiler Calibration

NPOESS National Polar-Orbiting Operational Environmental Satellite System

NPP NPOESS Preparatory Project

- NRZ-L Non-Return to Zero Level
- NRZ-M Non-Return to Zero Mark
- NTC Nadir Total Column
- NVM Non-volatile Memory

#### -0-

| OCD   | Operational Concept Description    |
|-------|------------------------------------|
| OCXO  | Oven Controlled Crystal Oscillator |
| OIW 💦 | Offset in Words                    |
| OMA   | Opto-Mechanical Assembly           |
| OMPS  | Ozone Mapping Profiling Suite      |
| OPD   | Optical Path Difference            |
|       |                                    |

#### -P-

| P/A | Preamp                             |
|-----|------------------------------------|
| PAM | Passive Analog Monitor             |
| PAT | Passive Analog Temperature         |
| PCA | Power Converter Assembly           |
| PCE | Processing and Control Electronics |
| PGA | Programmable Gain Amplifier        |
| pkt | Packet                             |
| PLB | Payload Bus                        |
| PLLO<br>PLO<br>PRT<br>PS                                                                                                                                                                               | Phase Lock-Loop Oscillator<br>Phase Lock-loop Oscillator<br>Platinum Resistance Temperature<br>Porchswing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>-Q-</b><br>QPSK                                                                                                                                                                                     | Quadrature Phase Shift Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| - <b>R</b> -<br>R/T<br>RAD<br>RDR<br>RDR<br>RF<br>RFE<br>RPS<br>R-S<br>R/T                                                                                                                             | Real-Time<br>Radiation<br>Random Access Memory<br>Raw Data Record<br>Radio Frequency<br>Receiver Front Ends<br>Receiver Power Supply<br>Reed-Solomon<br>Real-Time                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| -S-<br>S/C<br>SAW<br>SBRS<br>SCC<br>SCIF<br>SD<br>SDE<br>SDM<br>SDR<br>SDR<br>SDSM<br>SMA<br>SMCA<br>SMD<br>SNR<br>SOC<br>SPA<br>SPM<br>SPS<br>SQPSK<br>SS<br>SSA<br>SSM<br>SSR<br>SV<br>SWICS<br>SWIR | Spacecraft<br>Surface Acoustic Wave<br>Santa Barbara Remote Sensing (Raytheon)<br>Spacecraft Control Computer<br>Spacecraft Interface board<br>Solar Diffuser<br>Scan Drive Electronics<br>Scan Drive Mechanism<br>Sensor Data Record<br>Solar Diffuser Stability Monitor<br>Sensor Module Assembly<br>Survival Mode Configuration Assembly<br>Stored Mission Data<br>Signal to Noise Ratio<br>State-of-Charge<br>Signal Processing Assembly<br>Sun-Pointing Mode<br>Solar Presence Sensors<br>Staggered Quadrature Phase Shift Key<br>Space Segment<br>Sensor Scan Assembly<br>Scene Selection Module<br>Solid State Recorder<br>Space View<br>Shortwave<br>Shortwave Infrared |
| <b>-T-</b><br>TBD<br>TBS                                                                                                                                                                               | To be determined<br>To be supplied                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Check the NPP CCR website at <u>https://cicero.eos.nasa.gov/npp</u> to verify that this Is the correct version prior to use.

| TBR   | To be resolved                              |
|-------|---------------------------------------------|
| тс    | Total Column, Total Channel                 |
| тсс   | Total Column Calibration                    |
| TDRSS | Tracking Data Relay Satellite System        |
| TEC   | Thermal Electric Cooler                     |
| TID   | Table Identifier                            |
| TLM   | Telemetry                                   |
| TImv  | Telemetry                                   |
| TPG   | Timing Pattern Generator                    |
| _     | 5                                           |
| -U-   |                                             |
| UART  | Universal Asynchronous Receiver/Transmitter |
| UP    | Uninterruptible Power                       |
| UPS   | Uninterruptible Power Supply                |
| UTC   | Coordinated Universal Time                  |
|       |                                             |
| -V-   |                                             |
| VC    | Virtual Channel                             |
| VCDU  | Virtual Channel Data Unit                   |
| VCID  | Virtual Channel Identifier                  |
| VD    | Video Digitizer                             |
| VIIRS | Visible Infrared Imaging Radiometer Suite   |
| -W-   |                                             |
| WG    | W and G Bands                               |

| WG<br>WG_WL          | W and G Bands<br>W and G Band Warm Load (Calibration target) |
|----------------------|--------------------------------------------------------------|
| <b>-XYZ-</b><br>ZnSe | Zinc Selenium                                                |
| ZPD                  | Zero Path Difference                                         |
|                      | HO BEAL                                                      |
|                      |                                                              |
|                      |                                                              |
| Are.                 |                                                              |

| ZnSe | Zinc Selenium        |
|------|----------------------|
| ZPD  | Zero Path Difference |

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