JUNO UVS
REDUCED DATA RECORD (RDR)
DATA VOLUME
SOFTWARE INTERFACE SPECIFICATION

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SwRI® Project 12029

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Revision 1 Change 1

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REVISION NOTICE

Change	Date	Affected Portions
Initial draft	26 May 2011	
Draft revision	07 Dec 2012	
Draft revision	08 Jan 2014	
Draft revision	17 Apr 2014	Appendix A, Appendix E
Draft revised w/team feedback	30 Apr 2014	
Draft revised w/PDS feedback	30 May 2014	
Revised to split out photon list extension	28 Jul 2014	Section 3.2, Appendices A & E
Merged Ancillary and Science extension	01 May 2015	Merged photon list extension back into the ancillary file
Changed alternate SIS format from ASCII to PDF/A	19 Jan 2017	Table 7-3

1. PURPOSE AND SCOPE OF DOCUMENT

The purpose of this Data Product SIS is to provide users of the UVS RDR (CODMAC Level 3) data product with a detailed description of the product and a description of how it was generated, including data sources and destinations. The RDR product contains time-tagged sequences of calibrated and spatially located photon detections and calibrated histograms created from those sequences. Housekeeping data, which will be used to interpret the raw data, are also included. This SIS is intended to provide enough information to enable users to read and understand the data product. The users for whom this SIS is intended are the scientists who will analyze the data, including those associated with the Juno project, and those in the general planetary science community.

This Data Product SIS describes how the data in the RDR data product are acquired by the UVS instrument, and how they are processed, formatted, labeled, and uniquely identified. The document discusses standards used in generating the product and software that may be used to access the product. The data product structure and organization are described in sufficient detail to enable a user to read the product.

2. APPLICABLE DOCUMENTS

This Data Product SIS is intended to be consistent with the following documents:

1. Planetary Data System Standards Reference, version 3.8
2. Planetary Science Data Dictionary Document, revision E, August 28, 2002, JPL Document D-7116.
3. Definition of the Flexible Image Transport System (FITS), version 2.1b, December 9, 2005, IAU FITS Working Group (http://fits.gsfc.nasa.gov/iaufwg/).
4. Planetary Data System Archive Preparation Guide
5. Juno UVS EDR Archive Volume Software Interface Specification, 12029-EDRDP_SIS-01

3. DATA PRODUCT CHARACTERISTICS AND ENVIRONMENT

This section describes the UVS RDR data product in greater detail, including how the data are acquired, the types of data in the RDR, and how the data are processed and validated.

3.1 Instrument Overview

The Juno-UVS instrument is based on the Alice instrument launched on the New-Horizons mission to Pluto and the Lyman Alpha Mapping Project (LAMP) instrument on the Lunar Reconnaissance Orbiter (LRO). The instrument was developed by SwRI and delivered to JPL for integration onto the Juno spacecraft. The instrument consists of two main assemblies, a shoebox-sized sensor, which includes the optical system, and an electronics box housed in the spacecraft vault. In addition to this changed configuration (LAMP and Alice each consisted of a single assembly), a number of small changes are incorporated to adapt the instrument to the specific mission. A main design driver is the radiation environment which resulted in the separation of the instrument into two assemblies. Another major change is the addition of a scan mirror that allows the selection of an area of interest when the spinning spacecraft is close to Jupiter.

The instrument is a Rowland-circle imaging spectrograph that uses state-of-the-art MCP detector and UV optics technology. The telescope section focuses light entering the entrance apertures onto the entrance slit of the spectrograph section. Light that passes through the slit strikes a concave holographic toroidal diffraction grating, which focuses the UVS passband wavelengths onto the MCP detector. Photoelectrons

are created by the photocathode material on the front surface of the MCP Z-Stack and are multiplied by the Z-Stack to create an amplified charge cloud of ~10^7 electrons per event that is accelerated across a narrow gap to the XDL 2-D anode array. When this charge cloud exceeds a specified amplitude level set by the detector threshold, it will result in a valid detected event. In response to the event, the anode outputs signals that are converted by the detector electronics into a pixel location on the array. Thus, the use of the word pixel refers to the resolved location where the charge cloud hits the anode. The detector electronics encodes 2048 spectral pixel columns and 256 spatial pixel rows. For each event, the detector also reports the amplitude of each charge pulse as a five-bit number which indicates the pulse-height gain. The field-of-view (FOV) of the instrument is such that 6 of the spatial rows (3 top/3 bottom) and 400 spectral columns (200 left/200 right) are not in the active field of view of the instrument. The STIM pulses fall in this area and the remaining non-illuminated region may be used for detector health monitoring. A STIM pulse is a stimulation test pulse designed to test the health of the detector electronics signal chain without the need for high vacuum, high voltage, or an external light source.

3.2 Data Product Overview

The source of the data contained in the UVS Pipeline RDR data product is the UVS EDR data product, produced in an earlier stage (nicknamed "Lima") of the data processing pipeline from files received from the Juno mission containing, respectively, the UVS instrument low-speed housekeeping telemetry and the UVS science data. The next step (nicknamed "Mike") in the UVS data processing pipeline calibrates and spatially locates the data contained in the EDR data product. For each EDR data file we produce multiple science data files. The number of science data files depends on the number of frames contained in the EDR product.

The ancillary data file contains the following FITS extensions:

1. Calibrated Spectral Image: This is a reconstructed histogram generated from the photon list data in the EDR data product but with instrumental calibrations applied. This summary image is used as a "quick-look" check on data quality. [Extension 0 = primary FITS header and data unit (HDU)]
2. Acquisition List: This dataset contains a list of the generated frame acquisitions as determined from the housekeeping data file. The list includes, for each frame, the instrument frame sequence number, start and stop times, mode type, aperture door and other instrument state information. These data are simply copied as is from the EDR data product. [Extension 1]
3. Calibrated Photon List: This dataset contains a calibrated version of the complete photon list science dataset from the EDR data product, plus propagated estimated errors introduced by the separate calibration steps, plus ancillary spatial location and pointing information that is needed on a per-photon basis. These are the primary science data for use in making maps and other photon list derived science products. [Extension 2]
4. Ancillary Data: This dataset contains ancillary spatial location and pointing information that varies smoothly and slowly over the Juno orbit. Also included in this extension are other slowly varying instrument-related quantities such as the detector locations of the STIM pixels, a measure of the background dark signal, and data quality flags. Entries in this table are typically separated by 30s intervals instead of on a per-photon basis in order to reduce data volume and computation time. [Extension 3]

5. Calibrated Analog Count Rate: This dataset contains a high-resolution sequence of UV photon count rates as read from the housekeeping data, with corrections for deadtime applied. [Extension 4]
6. Calibrated Digital Count Rate: This dataset contains a high-resolution sequence of UV photon count rates computed from the calibrated photon list data for each acquisition (nominally the whole orbit), with corrections for deadtime applied. [Extension 5]
7. Housekeeping Data: This dataset contains the complete housekeeping dataset, both in raw format and, where applicable, in calibrated engineering units. These data are simply copied as is from the EDR data product. HK data are included here to assist with joint instrument and data quality trending analyses (foreseen and unforeseen). [Extension 6]
8. Wavelength Lookup Image: This dataset contains a 2048 x 256 image whose floating-point pixel values are the wavelengths corresponding to the pixel locations on the detector. This wavelength calibration image is provided to be used with Extension 0 for quick-look checks, but **not** for scientific analysis. Its file-averaged wavelength solution makes it generally unsuitable to be used with pixel list data. [Extension 7]
9. Mask Information: This dataset contains the coordinates and times of masks applied to the detector during observations. This data is parsed out of planning documents prepared by the operations team and the extension will be left empty if the planning document was unavailable at processing time. [Extension 8]

Detailed specifications for the UVS RDR data products can be found in Section 4 and Appendix A of this document.

3.3 Data Processing

Data format is described in Section 4, Detailed Data Product Specifications. Data volume will vary because it is a function of the UV photon detection rate. The exact number of science data frames will vary from file to file.

3.3.1 Data Processing Level

The UVS Pipeline RDR data product contains calibrated UV photon detections/spectra and associated data corresponding to CODMAC Level 3 (see Appendix D).

3.3.2 Data Product Generation

The UVS-generated science and housekeeping telemetry files will be retrieved from the spacecraft and then transferred to the primary UVS SOC pipeline computer. The UVS SOC pipeline "executive" program will execute once per day and detect the newly delivered data files. After cataloging the received files, the "executive" program will initiate execution of the UVS SOC data processing pipeline. The first element (nicknamed "Lima") of the pipeline will be responsible for converting the data files into the EDR data products. The second element of the pipeline ("Mike") will be responsible for applying instrumental calibrations to the science data and spatially locating the data with the help of input SPICE kernels, ultimately creating the Pipeline RDR data products whose format is described in this document. Multiple versions of the output Pipeline RDR products may be made available if software bugs affecting the output data are uncovered and corrected. In the event of an error whose correction alters released data, the data will be reprocessed by the revised software and made available.

3.3.3 Data Flow

The immediate source of the data contained in each UVS Pipeline RDR data product will be the UVS EDR data product as well as auxiliary spacecraft housekeeping data, attitude and geometric information from SPICE kernels, and instrument calibration files. The original source of the data contained in each UVS EDR data product will be the UVS instrument itself. UVS-generated data files will be retrieved from the Juno spacecraft and then transferred to the UVS SOC for further processing. After the UVS RDR data products are produced by the UVS SOC, they will be archived and transferred to the PDS for permanent storage and public access.

3.3.4 Data Processing Steps

In order to create the Pipeline RDR data product, the "Mike" part of the UVS pipeline will apply two primary types of conversions to the EDR data product: (1) instrumental corrections and calibrations, and (2) spatial location determination. In general, five different types of instrumental corrections and calibrations will be performed:

1. Deadtime correction – this accounts for the fact that the UVS MCP detector is insensitive to the detection of new UV photons for a short period of time following a previous detection, and this deadtime effect increases with increasing flux;
2. Flatfield normalization – this is performed to account for variations in sensitivity across the UVS MCP detector in the spatial dimension;
3. Effective area normalization – this is performed to account for the fact that the effective area (i.e., the sensitivity) of the UVS instrument aperture is wavelength dependent; and
4. Wavelength lookup image – this is created in order to specify the UV wavelength associated with each pixel of the detector.
5. Stray light correction – this correction accounts for instrument scattered light outside of the viewing scene contaminating the observation. An estimated signal level is subtracted. This estimation will be developed either from a detailed instrument simulator or analytical assessment of the collection of contaminated datasets (if any). The reliability of the scattered light estimation method requires in flight commissioning and/or science data and further demonstration; we might treat this effect by setting larger estimated (systematic) errors instead if this method proves unreliable. We may leave this effect untreated if the scattered light is shown to be negligible.

The deadtime, flatfield and effective area corrections and calibrations will result in a weighting factor to be applied to each detected UV photon. The end result will be that each detected photon will represent a number of "actual" photons that is slightly different than unity. The calculation of instrument pointing and the spatial location of the origin of the detected UV photons will be performed using SPICE kernels and SPICE toolkit software.

3.4 Standards Used in Generating Data Products

3.4.1 PDS Standards

The UVS RDR data product complies with Planetary Data System standards for file formats and labels, as specified in the PDS Standards Reference [1].

3.4.2 Coordinate Systems

UVS reduced data record (RDR) data use equatorial coordinates, with declination (Dec) as the latitudinal angle and right ascension (RA) as the longitudinal angle.

When a JPL ephemeris is used, the JPL Navigation and Ancillary Information Facility (NAIF) provides the necessary ephemeris file (SPK) and binary orientation file (PCK) in a Principal Axes (PA) reference frame for use with the SPICE Toolkit. NAIF also provides the frames kernel (FK) used for accessing the PA orientation in the PCK.

3.4.3 Data Storage Conventions

The UVS RDR data product complies with the FITS standard for file formats and data storage conventions, as specified in the Definition of the Flexible Image Transport System (FITS) [8].

3.5 Data Validation

UVS RDR data products will be validated by the UVS Team for science content and for compliance with PDS archive standards [1].

4. DETAILED DATA PRODUCT SPECIFICATIONS

The UVS RDR data products shall be grouped into directories with one directory per flight day. Flight day is defined to be midnight-to-midnight UTC. Within each directory shall be labels containing pointers to the corresponding individual data products.

4.1 Data Product Structure and Organization

The structure of the DATA directory is based primarily on orbit numbers. For earlier phases of the mission the directories will be based on specific activities. See section 7.6 for details.

4.2 Data Format Descriptions

The types of data included in the UVS RDR data product are listed in Section 3.2. All of these data are stored in a single FITS file with a detached PDS label. Each data type within the FITS file is stored in a separate HDU (Header and Data Unit). Three data types, the reconstructed histograms, will be stored as FITS images within their HDUs, the acquisition list will be stored as a FITS ASCII table, and the remaining data types will be stored as FITS binary tables. A detailed listing of the proposed FITS format of the UVS RDR data product is given in Appendix A.

A discussion of the interpretation of the frame data (FITS Extension 1) is warranted here. As described in the sample PDS header in Appendix E of this document, the binary frame data table consists of two columns. The first column gives the generation time of the frame as an 8-byte double precision value expressing the number of integral and fractional seconds elapsed since the epoch used for SCUT. The second column contains the 32766 24-bit words of the data frame itself.

In order to identify the science data frames (packets), a single 48-bit word header starts the frames. The header is generated by the acquisition hardware and includes the information listed in Table 4-1.

Table 4-1: UVS Science Frame Header

Field	Size in bits	Description
Hack Rate	4	0 = 1 ms, 1 = 2 ms, 3 = 4 ms, … 9 = 512 ms
Frame Size	2	0 = 16k entry, 1 = 32k entry, 2 = 64k entry
Memory	1	0 = ping (side A) 1 = pong (side B)
Final Frame	1	0 = intermediate frame 1 = last frame (acquisition cycle terminated)
Frame Counter	16	Frame number since instrument power on
Quality Number	8	Periodically (100 ms) calculated Quality Number, last one calculated is reported
Tag Byte 2	8	These are used during operations to link a commanded observation/acquisition to the returned data.
Tag Byte 3	8	

Each 24-bit word in the remainder of the frame either describes a photon event or a time hack. The least significant five bits distinguish these. When their value is 0, the entry is a time hack. Any other value indicates a pulse height (amplitude) of a photon event. A photon event encodes the location of the detected event consisting of an 11-bit encoded spectral location and an 8-bit encoded spatial location in the remaining 19 data bits. The time hack is used to provide temporal information about the photon events. The acquisition hardware will generate and insert time hacks in the frame on a periodic basis (configurable for each acquisition in a range of 1 – 512 msec). The highest bit of the time hack is an unused pause bit. In the remaining 18 bits, the time hack contains an incrementing counter that counts the number of 1 msec periods. This value allows for data recovery in case of lost frames (packets).

4.3 Label and Header Descriptions

Each UVS RDR data file is described by a PDS label in a separate file with the same root name, but with the extension ".LBL". The label file is stored in the same directory as the FITS data file that it describes. The contents of the PDS label file are derived in part from the FITS header information contained in the HDU headers of the data file itself.

The data files themselves do not contain any embedded PDS headers, but do contain FITS headers according to the FITS standard [8].

An example of the FITS header is given in Appendix A.

5. APPLICABLE SOFTWARE

The format of the UVS RDR data product is standard FITS. There are a number of different software libraries available that enable the reading and writing of standard FITS files. These libraries are written in a number of different languages and are available for a variety of different computing platforms. A list of these libraries can be found at the FITS Support Office web site (http://fits.gsfc.nasa.gov/). Commonly used FITS libraries include the IDL Astronomy Library (http://idlastro.gsfc.nasa.gov/fitsio.html) and the CFITSIO/FITSIO library (http://heasarc.gsfc.nasa.gov/docs/software/fitsio/fitsio.html). For this reason, no additional special software will be included in the EDR archive to parse and interpret the data files.

5.1 Utility Programs

No utility programs are planned at this time. However, they may be included in future revisions.

5.2 Applicable PDS Software Tools

PDS archive products should be able to be displayed with the program NASAVIEW, developed by the PDS and available free of charge for a variety of computer platforms from the PDS web site (http://pds.jpl.nasa.gov/tools/software_download.cfm).

5.3 Software Distribution and Update Procedures

Any developed software specific to UVS RDR data products will be distributed with the RDR archive. Version numbers and a CHANGELOG document will describe updates. At this time, however, no need for any such software is anticipated.

6. ARCHIVE VOLUME GENERATION

6.1 Archive Structure and Identification

PDS data set names shall conform to the following format: JUNO <target> UVS <data type> <calibration state> DATA V<major version>.<minor version>. For example, version one of the UVS science data set will be named JUNO J UVS 3 CALIBRATED DATA V1.0

PDS data set identifiers (DSID) will be abbreviated versions of the data set names formed according to the PDS formation rule for the DATA_SET_ID keyword. For example, the DSID for the data set above would be JNO-J-UVS-3-RDR-V1.0.

Each archive volume has the same general structure, consisting of a set of fixed top-level directories, INDEX, DOCUMENT, CATALOG, CALIB, DATA. Archive volumes may optionally include BROWSE and EXTRAS directories. The BROWSE directory contains browse data products intended to permit quick-look evaluation of the data. The EXTRAS directory contains files that are helpful but not required for interpretation of the archived data. The contents of each directory will be described below.

6.2 Data Production and Transfer Methods

The instrument operations team (IOT) produces the individual data files and the associated PDS labels for each of the standard data products defined in the data product SISs. Data files will contain all data of the appropriate type for the time interval contained in the data product. Data products will be transferred via secure FTP to the JSOC. Upon receipt at the JSOC, the data files and their corresponding labels will be checked for consistency and compliance with the PDS standards. Files and labels that pass this check will be placed in directories that mirror the archive organization. The JSOC will return a positive or negative acknowledgement via email to the IOT. Upon receipt of a negative acknowledgement, the IOT will diagnose and correct the errors and resubmit the data.

The JSOC transfers data products to the PDS discipline node. Data products will be compressed (Gzipped) and transferred via secure FTP to the PDS node. Each data transfer is logged. Upon notification of the data transfer, the PDS node decompresses the transfer and compares its contents against the transfer information. Each data file is validated against the MD5 checksum contained the corresponding detached label. The PDS node will post a positive or negative acknowledgement of the data receipt. If the acknowledgement is positive, no further action is required on the part of JSOC. If the acknowledgement is negative, the transfer is repeated after diagnosis and correction of the cause of the transfer error.

6.3 Volume Creation

The PDS node collects the data files and labels provided by the JSOC team onto archive volumes. Each archive volume contains all instrument data available for the time interval covered by the archive volume.

6.4 Volume Validation Methods

Validation of the instrument data archive is completed in two phases. The first phase is performed by the PDS node and consists of reviewing a sample, pathfinder data set for compliance with the PDS standards. The instrument team will submit a set of data files following the procedure of section 6.2 above. Upon receipt, the PDS node will confirm the structure of the files and labels. Once the sample data are validated, PDS will develop software to generate subsequent data volumes in an automated fashion.

The second phase of the validation consists of a peer review to ensure usability and completeness. The peer review panel will consist of members of the instrument team, the PDS discipline node and Central Nodes of the PDS, and at least two outside scientists actively working in the field. The PDS personnel will be responsible for validating that the archive volume(s) are fully compliant with PDS standards. The instrument team and outside science reviewers will be responsible for verifying the content of the data set, the completeness of the documentation, and the usability of the data in its archive format. Any deficiencies in the archive volume will be recorded as liens against the product by the review panel. After all liens placed against the product or the product generation software are resolved, automated production and validation can begin.

Once automated production begins, the data file content will be spot checked by members of the instrument team. The data will be used by team members to perform their analysis. Any discrepancies in the data noted during these activities will be investigated. If the discrepancy is a data error, the response will depend on the source of the error. If the error is in the software producing the data product, the error will be corrected and the data products affected will be reproduced. If there is a correctable error in a data file, the file will be replaced. If an error in a data file is uncorrectable, the error will be described in the cumulative errata file included on each volume in the volume set. The structure of data files and labels will be spot checked by the PDS discipline node for compliance with PDS standards and this SIS.

7. ARCHIVE VOLUME CONTENTS

This section describes the contents of the standard product archive collection volumes, including the file names, file contents, file types, and organizations responsible for providing the files. The complete directory structure is shown in Figure 1, below.

7.1 Root Directory Contents

The following files are contained in the root directory, and are produced by the instrument team. All of these files are required by the PDS Archive Volume organization standards.

Table 7-1: Root Directory Contents

File Name	File Contents	Provided By
AAREADME.TXT	This file completely describes the Volume organization and contents (PDS label attached).	IOT

Table 7-1: Root Directory Contents		
File Name	**File Contents**	**Provided By**
ERRATA.TXT	A cumulative listing of comments and updates concerning all Standard Data Products on all Volumes in the Volume set published to date.	IOT
VOLDESC.CAT	A description of the contents of this Volume in a PDS format readable by both humans and computers.	IOT

7.2 INDEX Directory Contents

The following files are contained in the index directory and are produced by the PDS discipline node. The INDEX.TAB file contains a listing of all data products on the archive volume. In addition, there is a cumulative index file (CUMINDEX.TAB) that lists all data products in the archive volume set to date. The index and index information (INDXINFO.TXT) files are required by the PDS volume standards. The index tables include both required and optional columns. The cumulative index file is also a PDS requirement; however, this file is not reproduced on each data volume. An online and web accessible cumulative index file is maintained at the PDS discipline node while archive volumes are being produced. Only the last archive volume in the volume series will contain a cumulative index file.

Table 7-2: Index Directory Contents		
File Name	**File Contents**	**Provided By**
INDXINFO.TXT	A description of the contents of this directory	IOT
INDEX.TAB	A table listing all Data Products on this Volume	IOT
INDEX.LBL	A PDS detached label that describes INDEX.TAB	IOT

7.3 DOCUMENT Directory Contents

The document directory contains documentation that is considered to be either necessary or simply useful for users to understand the archive data set. Documents may be included in multiple forms (ASCII, PDF, MS Word, HTML with image file pointers, etc.). PDS standards require that any documentation deemed required for use of the data be available in some ASCII format. Clean HTML is acceptable as ASCII formats in addition to plain text. The following files are contained in the DOCUMENT directory and are produced or collected by the PDS discipline node.

Table 7-3: Document Directory Contents		
File Name	**File Contents**	**Provided By**
DOCINFO.TXT	A description of the contents of this directory	IOT
12029-RDRDP_SIS-01.DOC	The Archive Volume SIS (this document) in Microsoft Word format	IOT
12029-RDRDP_SIS-01.PDF	The Archive Volume SIS (this document) in PDF/A format	IOT
12029-RDRDP_SIS-01.LBL	A PDS detached label that describes 12029-RDRDP_SIS-01.ASC and 12029-RDRDP_SIS-01.DOC.	IOT
Other Documents	Additional documents describing data processing, calibration etc.	IOT
Other Document labels	Detached PDS labels for any additional documents	IOT

7.4 CATALOG Directory Contents

The completed PDS catalog files in the catalog directory provide a top-level understanding of the Juno mission and its data products.

Each file in the catalog directory contains an individual PDS catalog object. These objects provide a top-level understanding of the Juno mission, the instrument and its data products. The data set catalog files will be provided by the instrument team, and the CATINFO.TXT by the PDS discipline node.

Table 7-4: Catalog Directory Contents		
File Name	**File Contents**	**Provided By**
CATINFO.TXT	A description of the contents of this directory	IOT
UVS_RDR_DS.CAT	PDS Data Set catalog description of appropriate to the data set	IOT
INSTHOST.CAT	PDS instrument host (spacecraft) catalog description of the Juno spacecraft	Juno Project
UVS_INST.CAT	PDS instrument catalog description of the instrument	IOT

Table 7-4: Catalog Directory Contents		
File Name	**File Contents**	**Provided By**
MISSION.CAT	PDS mission catalog description of the Juno mission	Juno Project
PERSON.CAT	PDS personnel catalog description of instrument Team members and other persons involved with generation of Data Products	IOT
REF.CAT	Instrument-related references mentioned in other *.CAT files Additional bibliographic references, as appropriated	IOT

7.5 CALIB Directory Contents and Naming Conventions

The calibration directory contains one or more files of instrument calibration data. An additional file will be added when the instrument characteristics have either changed or been more precisely determined.

Table 7-5: Calibration Summary File Naming Convention Filename format: [UVS_yyyyddd_CAL_Vvv.ext]		
Identifier	**Description**	**Options**
UVS	Instrument identifier	
yyyyddd	Date of validity	yyyy - Year ddd - Day of Year
vv	Version number of data	01, 02, ..., etc.
ext	file name extension	any PDS compliant file name extension

7.5.1 Required Files

The calibration directory contains a file named INFO.TXT that is an ASCII text description of the CALIB directory contents. Detached PDS labels will describe the calibration summary files. The label files will have the same root name as the calibration file that they describe with the suffix ".LBL" replacing the PDS compliant file name extension suffix.

7.5.2 CALIB Directory Contents

The calibration data are organized in a flat directory structure, with the CALIB directory containing all of the calibration summary files and their labels.

Table 7-6: Calibration Directory Contents		
File Name	File Contents	Provided By
CALINFO.TXT	Brief description of directory contents and naming conventions.	IOT
CAL.CSV	Calibration file.	IOT
CAL.LBL	PDS label for CAL file of same base name.	IOT

7.6 DATA (Standard Products) Directory Contents and Naming Conventions

The data directory contains the actual data products produced by the instrument. The data directory will be divided into a subdirectory for each perijove pass, containing data for the entire orbit containing that perijove. The data directory will also have a subdirectory for cruise data.

7.6.1 Required Files

Every subdirectory beneath the data directory contains a file named INFO.TXT that is an ASCII text description of the directory contents. Every file in the data path of an Archive Volume must be described by a PDS label. All labels will be detached, having the same root name as the file they describe with the suffix ".LBL". In directories where there are multiple data files with the same internal format, the format description may be included in a single format file (.FMT) that is referenced by a pointer within each PDS label file. This prevents the needless repetition of information that is not changing within the PDS label files.

7.6.2 DATA Directory Contents

The data directory contains a separate subdirectory for each orbit. The subdirectories will be named with the number of the perijove contained in the orbit. There may be more than one data file in each subdirectory, depending on what events take place in a given orbit. For example, there may be a file containing the perijove pass data, a file containing the science data collected during the calibration period of the instrument, and one for the remainder of the orbit.

Table 7-7: Data Directory Contents		
File Name	**File Contents**	**Provided By**
UVS_ SSS_SSSSSSSSS _ CCYYDDD_SSSSSS_Vvv.FIT	Data file.	IOT
UVS_ SSS_SSSSSSSSS _ CCYYDDD_SSSSSS_Vvv.LBL	PDS label for data files of same base name.	IOT

7.6.3 File Naming Convention

File names are formed by concatenating descriptive elements. These elements include dates, time, versions. Tokens representing each of these elements are listed in Table 7-8. The extension indicates the type of data found in the file and are specified in Table 7-9.

Data files are names are formed according to the following conventions

ins_string_ccyyddd_string_V##.ext

Tokens in *italics* are replaced by the appropriate file name element. Items in **bold** are included exactly as is. Alternates are enclosed in brackets, with each alternative separated by a vertical bar, thusly: [a|b|c]. Optional elements are enclosed in brackets, [*opt*] Each instrument has a 3 character mnemonic used for identification, as specified in the Table 7-10, below.

Table 7-8: Filename Convention Elements	
token	description
cc	The century portion of a date, 19 or 20
yy	The year of century portion of a date, 00-99
ddd	The day of year, 001-366
T	delimiter between date and time
hh	The hour portion of time, 00-23
mm	The minutes portion of time, 00-59
ss	The seconds portion of time, 00-60
fff	The thousandths of a second portion of the time 000-999
ins	The three character instrument abbreviation
string	An arbitrary alphanumeric character string
oo	Perijove number, 00-99.
l	CODMA data level, 2, 3,…,8
##	A numeric string with as many digits as characters in the token, padded with leading zeros
ext	A file name extension indicating the contents of the file. See table xxx for extensions
I F C	Time stamp identifiers, **I**nitial time, **F**inal time, and **C**reation time, that prefix a date/ time string.

Table 7-9: Filename Extensions	
Extension	Description
ASC	Plain ASCII documentation file
CAT	Catalog object
CSV	Spreadsheet (comma-separated value)
DAT	Binary data, not otherwise specified
FIT	Flexible Image Transport System files (preferred)
FTS	Flexible Image Transport System files (depreciated)
FMT	Include file for describing data objects, normally referred to by labels
GIF	GIF image
IMG	Image data
JPG	JPEG image data
LBL	Detached label
PDF	Portable document format data
PNG	Portable network graphics data
QUB	Spectral image QUBE data
TIF	Tagged Image File data
TXT	Plain text documents

Table 7-10: Instrument Mnemonic	
Instrument Name	Mnemonic
Advanced Stellar Compass	ASC
Fluxgate Magnetometer	FGM
Gravity Science	GRV
Jovian Auroral plasma Distributions Experiment	JAD
Jupiter Energetic-Particle Detector Instrument	JED
Jovian Infrared Auroral Mapper	JIR
Juno EPO Camera	JNC
Microwave Radiometer	MWR

Table 7-10: Instrument Mnemonic	
Instrument Name	Mnemonic
Ultraviolet Spectrograph	UVS
Radio and Plasma Waves Instrument	WAV

7.7 EXTRAS Directory Contents

The EXTRAS directory contains files that are helpful, but are not required to interpret the INSTRUMENT data. Files in the EXTRAS directory are exempt from labeling requirements. Subdirectories are used to organize the items into groups of related files. The EXTRAS directory, if present must contain the EXTRAINFO.TXT file that identifies the function or purpose of each file in the directory.

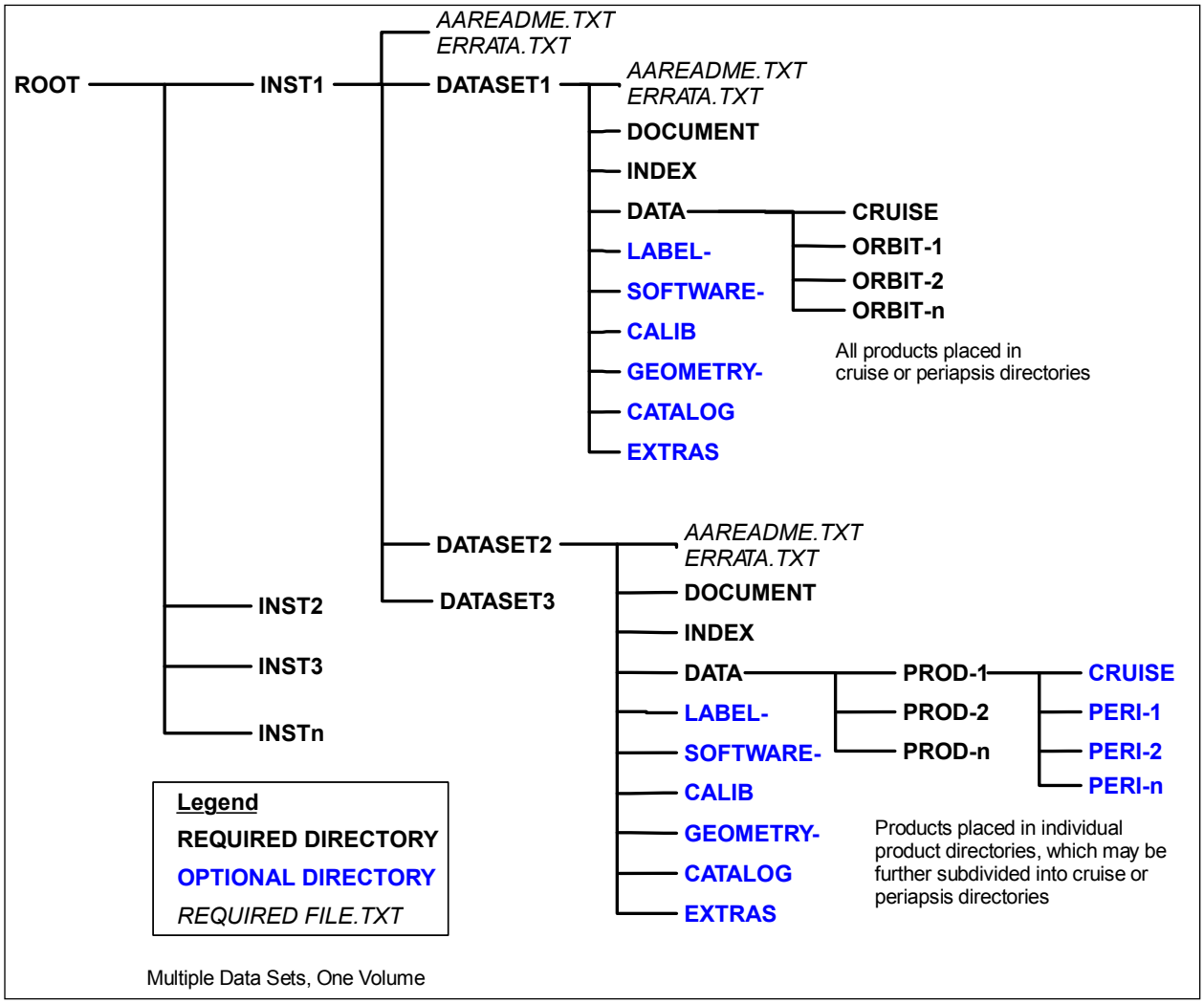

Figure 1, Directory and Volume Structure. This diagram shows the directory structure at the JSOC, which mirrors the PDS volume structure.

APPENDIX A – DETAILED UVS EDR FITS FILE SPECIFICATIONS

For each of the FITS HDUs described in Section 4.2 of this document, this Appendix lists and describes the specific header keywords and provides details on the format and layout of the data. Values followed by an asterisk (*) are variable on a per-file basis and are examples only.

Sample Science File

FITS Header Keyword	Value	Description
FITS File Header	Primary HDU	
SIMPLE	T	conforms to FITS standard
BITPIX	32	array data type
NAXIS	0	number of array dimensions
EXTEND	T	FITS extensions present
HOSTNAME	'JUNO'	Host name (PDS terminology)
INSTRUME	'UVS'	Ultraviolet Spectrograph
FILETIME	'2014-211T08:55:55'	Time file was created (UTC)
END		
XTENSION	'BINTABLE'	Extension 1, Calibrated Photon List
BITPIX	8	array data type, 8-bit bytes
NAXIS	2	number of array dimensions
NAXIS1	86	number of bytes per frame
NAXIS2	1000 (*)	number of detected photons
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	19	Number of element fields per line
EXTNAME	'Calibrated Photon List'	Extension name
EXTVER	1	Extension version number
TFORM1	'I10'	Column 1 format
TTYPE1	'HACKTIME'	Label for column 1
TFORM2	'I4'	Column 2 format
TTYPE2	'DETECTOR_X'	Label for column 2
TFORM3	'I3'	Column 3 format
TTYPE3	'DETECTOR_Y'	Label for column 3
TFORM4	'I3'	Column 4 format
TTYPE4	'SPATIAL_ROW'	Label for column 4
TFORM5	'14'	Column 5 format
TTYPE5	'WAVELENGTH'	Label for column 5
TFORM6	'E'	Column 6 format
TTYPE6	'SPIN_PHASE'	Label for column 6
TFORM7	'D12'	Column 7 format
TTYPE7	'ET '	Label for column 7
TFORM8	'I2'	Column 8 format
TTYPE8	'PULSE_HEIGHT'	Label for column 8
TFORM9	'F12.2'	Column 9 format
TTYPE9	'RA '	Label for column 9
TFORM10	'F12.2'	Column 10 format

FITS Header Keyword	Value	Description
TTYPE10	'DEC '	Label for column 10
TFORM11	'F12.2'	Column 11 format
TTYPE11	'WEIGHTED_COUNT'	Label for column 11
TFORM12	'F12.2'	Column 12 format
TTYPE12	'LATITUDE'	Label for column 12
TFORM13	'F12.2'	Column 13 format
TTYPE13	'LONGITDE'	Label for column 13
TFORM14	'F12.2'	Column 14 format
TTYPE14	'ALTITUDE'	Label for column 14
TFORM15	'F12.2'	Column 15 format
TTYPE15	'INCIDENCE_ANGLE'	Label for column 15
TFORM16	'F12.2'	Column 16 format
TTYPE16	'EMISSON_ANGLE'	Label for column 16
TFORM17	'E'	Column 17 format
TTYPE17	'DIGITAL_DEADTIME'	Label for column 17
TFORM18	'E'	Column 18 format
TTYPE18	'ANALOG_DEADTIME'	Label for column 18
TFORM19	'10A'	Column 19 format
TTYPE19	'LOCAL_TIME'	Label for column 19
END		
Extension 1 HDU Data	**Calibrated Photon List Mode Data**	**Binary Table**

Sample Ancillary File

FITS Header Keyword	Value	Description
FITS File Header	Primary HDU	
SIMPLE	T	conforms to FITS standard
BITPIX	32	array data type
NAXIS	2	number of array dimensions
NAXIS1	2048	number of spectral channels
NAXIS2	256	number of spatial channels
EXTEND	T	FITS extensions present
BZERO	0	no offset
BSCALE	1	default scaling factor
MISSION	'JUNO'	
HOSTNAME	'JUNO'	Host name (PDS terminology)
INSTRUME	'UVS'	Ultraviolet Spectrograph
FILETIME	'2012-146T20:46:00'*	Time file was created (UTC)
ORIGIN	'SwRI'	Southwest Research Institute
HKSTRSEC	376985155.720*	HK data file start time (SCLK, sec)
HKENDSEC	377013535.720*	HK data file stop time (SCLK, sec)
HKSTRTIM	'2011-346T18:04:52.720'*	HK data file start time (approximate UTC)

FITS Header Keyword	Value	Description
HKENDTIM	'2011-347T01:57:52.720'*	HK data file stop time (approximate UTC)
SCSTRSEC	376986296.062*	Sci data file start time (SCLK, sec)
SCENDSEC	377013457.738*	Sci data file stop time (SCLK, sec)
SCSTRTIM	'2011-346T18:23:52.062'*	Sci data file start time (approximate UTC)
SCENDTIM	'2011-347T01:56:34.737'*	Sci data file stop time (approximate UTC)
NUMGAPS	16327*	Number of gaps in pixel data
GAPFRAME	5*	Number of frames containing gaps
DATATYPE	'varies'*	Data type for all frames
PHASENUM	'varies'*	Phase number for all frames
PHASE	'varies'*	Phase for all frames
FRAMESEQ	'varies'*	Frame sequence for all frames
MINCTR	0.000000*	Minimum countrate (Hz)
AVRCNTR	2120.257580*	Average countrate (Hz)
MAXCNTR	180000.000000*	Maximum countrate (Hz)
PACKETS	14191*	Number of packets
HKDROPEN	1*	Setting state for dropping startup HK packets
HKDROP	2*	Number of startup HK packets dropped
TEMPSFTY	'none'*	Temperature safety
CYCLSFTY	'none'*	Cycle safety
ANODSFTY	'none'*	Anode safety
STRPSFTY	'none'*	Strip safety
HVSFTY	'none'*	High Voltage safety
BRTSFTY	'none'*	Bright Object Safety
HVSET	-4.177488*	Stable HV Set Voltage
MCPVMIN	-4.191646*	Minimum MCP Voltage (kVolt)
MCPVMAX	0.000000*	Maximum MCP Voltage (kVolt)
ANOVMAX	0.000000*	Maximum Anode Voltage (kVolt)
STPIMIN	0.000000*	Minimum Strip Current (kVolt)
STPIMAX	8.832249*	Maximum Strip Current (kVolt)
MINDISC	1*	Low Discriminator Value
MAXDISC	31*	High Discriminator Value
EVCNTLO	1*	Lowest value of 24 bit HW raw event counter
EVCNTHI	16776798*	Highest value of 24 bit HW raw event counter
EVCOUNTS	16776797*	Total number of raw events reported
APDOOR	'varies'*	Aperture door status
MINMIRAT	1.864194*	Scan Mirror A Minimum Temperature
AVRMIRAT	3.428284*	Scan Mirror A Average

FITS Header Keyword	Value	Description
		Temperature
MAXMIRAT	3.772501*	Scan Mirror A Maximum Temperature
MINMIRBT	1.864191*	Scan Mirror B Minimum Temperature
AVRMIRBT	3.393853*	Scan Mirror B Average Temperature
MAXMIRBT	3.772501*	Scan Mirror B Maximum Temperature
MINOAPAT	0.340716*	OAP Mirror A Minimum Temperature
AVROAPAT	4.091866*	OAP Mirror A Average Temperature
MAXOAPAT	5.298464*	OAP Mirror A Maximum Temperature
MINOBPAT	0.340716*	OAP Mirror B Minimum Temperature
AVROBPAT	4.069183*	OAP Mirror B Average Temperature
MAXOBPAT	4.917215*	OAP Mirror B Maximum Temperature
MINGRTAT	3.390757*	Grating A Minimum Temperature
AVRGRTAT	4.640272*	Grating A Average Temperature
MAXGRTAT	5.679482*	Grating A Maximum Temperature
MINGRTBT	3.390757*	Grating B Minimum Temperature
AVRGRTBT	4.759841*	Grating B Average Temperature
MAXGRTBT	6.060231*	Grating B Maximum Temperature
MINCDHAT	6.820777*	C&DH A Minimum Temperature
AVRCDHAT	14.516661*	C&DH A Average Temperature
MAXCDHAT	16.192519*	C&DH A Maximum Temperature
MINHVPST	6.820777*	HVPS Minimum Temperature
AVRHVPST	14.137295*	HVPS Average Temperature
MAXHVPST	16.192519*	HVPS Maximum Temperature
MINLVPST	6.440674*	LVPS Minimum Temperature
AVRLVPST	17.182114*	LVPS Average Temperature
MAXLVPST	18.818156	LVPS Maximum Temperature
MINDETHT	1.482907*	Detector Body Minimum Temperature
AVRDETHT	4.330044*	Detector Body Average Temperature
MAXDETHT	5.298464*	Detector Body Maximum Temperature

FITS Header Keyword	Value	Description
MINDETET	-0.039287*	Detector Elc Minimum Temperature
AVRDETET	10.614455*	Detector Elc Average Temperature
MAXDETET	11.721900*	Detector Elc Maximum Temperature
MINSMIBT	6.440674*	SMIB Minimum Temperature
AVRSMIBT	14.542425*	SMIB Average Temperature
MAXSMIBT	16.192519*	SMIB Maximum Temperature
MINCHAST	1.482907*	Chassis Minimum Temperature
AVRCHAST	3.676146*	Chassis Average Temperature
MAXCHAST	4.535776*	Chassis Maximum Temperature
DETDOOR	'open'*	Detector door status
SPINRATE	30*	Number of seconds per spin
HACKCLCK	0.000999993322*	Instrument actual hack clock
HACKOFFS	376985151.649*	Instrument hack clock offset
HACKCORR	1.000000*	Instrument hack clock correlation
SL2PROC	'UvsMike'	SOC pipeline level 2 software
SL2REV	'15658'*	SOC pipeline level 2 software revision
SL2DATE	'2012-05-23'*	SOC pipeline level 2 software date
IN_FILE	'UVS_ENG_434589840_2013283_efbobs_V01.FIT'*	Name of Lima file used for input
FLATFILE	'uvs-flatfield-main.txt'*	Detector flatfield file
NUMKERNS	12*	Number of loaded SPICE kernels
KERN01	'naif.tls'*	SPICE kernel 01
KERN02	'pck.tpc'*	SPICE kernel 02
KERN03	'jup230l.bsp'*	SPICE kernel 03
KERN04	'jup255.bsp'*	SPICE kernel 04
KERN05	'jup282.bsp'*	SPICE kernel 05
KERN06	'de425.bsp'*	SPICE kernel 06
KERN07	'juno_v02.tf'*	SPICE kernel 07
KERN08	'JNO_SCLKSCET.00018.tsc'*	SPICE kernel 08
KERN09	'spk_rec_131005_131014_131101.bsp'*	SPICE kernel 09
KERN10	'juno_uvs_rec_20131009_20131009_ver01.bc'*	SPICE kernel 10
KERN11	'juno_sc_rec_131006_131012_v01.bc'*	SPICE kernel 11
KERN12	'juno_uvs_v02.ti'*	SPICE kernel 12
END		
Primary HDU Data	**Calibrated Spectral Image**	**2-D array 2048x256 of 32 bit event counts**
XTENSION	'TABLE'	Extension 1: Frame List
BITPIX	8	array data type, 8-bit ASCII characters
NAXIS	2	number of array dimensions
NAXIS1	185	number of characters per line
NAXIS2	2573 (*)	number of acquisitions

FITS Header Keyword	Value	Description
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	20	Number of element fields per line
EXTNAME	'Frame List'	Frames from science data
EXTVER	1	Extension version number
TFORM1	'I5'	Format of field 1
TFORM2	'D14.3'	Format of field 2
TFORM3	'I10'	Format of field 3
TFORM4	'I10'	Format of field 4
TFORM5	'D14.3'	Format of field 5
TFORM6	'D14.3'	Format of field 6
TFORM7	'I3'	Format of field 7
TFORM8	'I5'	Format of field 8
TFORM9	'I1'	Format of field 9
TFORM10	'I3'	Format of field 10
TFORM11	'I1'	Format of field 11
TFORM12	'I2'	Format of field 12
TFORM13	'I5'	Format of field 13
TFORM14	'I8'	Format of field 14
TFORM15	'I8'	Format of field 15
TFORM16	'I2'	Format of field 16
TFORM17	'I10'	Format of field 17
TFORM18	'I5'	Format of field 18
TFORM19	'I1'	Format of field 19
TFORM20	'A64'	Format of field 20
TBCOL1	1	Start column for field 1
TBCOL2	6	Start column for field 2
TBCOL3	16	Start column for field 3
TBCOL4	26	Start column for field 4
TBCOL5	43	Start column for field 5
TBCOL6	60	Start column for field 6
TBCOL7	63	Start column for field 7
TBCOL8	68	Start column for field 8
TBCOL9	69	Start column for field 9
TBCOL10	72	Start column for field 10
TBCOL11	73	Start column for field 11
TBCOL12	75	Start column for field 12
TBCOL13	80	Start column for field 13
TBCOL14	88	Start column for field 14
TBCOL15	96	Start column for field 15
TBCOL16	98	Start column for field 16
TBCOL17	108	Start column for field 17
TBCOL18	113	Start column for field 18
TBCOL19	114	Start column for field 19
TBCOL20	178	Start column for field 20
TTYPE1	'FRAME_COUNTER'	Frame counter value (0-65535)
TTYPE2	'SC_RCVD_TIME'	Spacecraft received time
TTYPE3	'FIRST_TIMEHACK'	First timehack

FITS Header Keyword	Value	Description
TTYPE4	'LAST_TIMEHACK'	Last timehack
TTYPE5	'SC_TIME_FIRST_HACK'	Spacecraft time of the first timehack
TTYPE6	'SC_TIME_LAST_HACK'	Spacecraft time of the last timehack
TTYPE7	'TAG_BYTE_1'	Tag byte 1
TTYPE8	'TAG_BYTE_2'	Tag byte 2
TTYPE9	'TAG_BYTE_3'	Tag byte 3
TTYPE10	'QUALITY_FLAG'	Quality flag
TTYPE11	'MEMORY_SIDE'	Memory side (0=A, 1=B)
TTYPE12	'HACK_RATE'	Hack rate (0=1ms, 1=2ms, 3=4ms, … 9=512ms)
TTYPE13	'NUM_TIMEHACKS'	Number of timehacks
TTYPE14	'FRMSUM'	Computed frmsum
TTYPE15	'CHKSUM'	Computed chksum
TTYPE16	'TYPE'	Computed frame type
TTYPE17	'CLOCK_PERIOD'	Clock period assigned to frame
TTYPE18	'NUM_ACQS'	Number of actual acquisitions
TTYPE19	'EXPECTED'	Was frame counter 1 + previous frame counter?
TTYPE20	'FILE'	Source file name
TDISP10	'Z2.2'	Use hex display format for quality
TDISP15	'Z6.6'	Use hex display format for chksum
END		
Extension 1 HDU Data	**Frame List**	**ASCII Data Table with number of entries matching number of acquisitions, empty if no acquisitions reported in housekeeping data**
XTENSION	'BINTABLE'	Extension 2, Ancillary Data
BITPIX	8	array data type, 8-bit bytes
NAXIS	2	number of array dimensions
NAXIS1	**TBD**	number of bytes per frame
NAXIS2	1000 (*)	number of records
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	85	Number of element fields per line
EXTNAME	'Ancillary Data'	Extension name
EXTVER	1	Extension version number
TFORM1	'D12'	Column 1 format
TTYPE1	'ET_SLOW '	Label for column 1
TFORM2	'I10'	Column 2 format
TTYPE2	'HACKTIME'	Label for column 2
TFORM3	'I2'	Column 3 format
TTYPE3	'ORBIT_NUM'	Label for column 3
TFORM4	'F12.2'	Column 4 format

FITS Header Keyword	Value	Description
TTYPE4	'SCAN_MRR_ANG'	Label for column 4
TFORM5	'F12.2'	Column 5 format
TTYPE5	'SOLAR_ZENITH_ANG'	Label for column 5
TFORM6	'F12.2'	Column 6 format
TTYPE6	'SC_SHADOW_FLAG'	Label for column 6
TFORM7	'F12.2'	Column 7 format
TTYPE7	'SUBSOLAR_LAT'	Label for column 7
TFORM8	'F12.2'	Column 8 format
TTYPE8	'SUBSOLAR_LON'	Label for column 8
TFORM9	'F12.2'	Column 9 format
TTYPE9	'SUBSC_LAT'	Label for column 9
TFORM10	'F12.2'	Column 10 format
TTYPE10	'SUBSC_LON'	Label for column 10
TFORM11	'F12.2'	Column 11 format
TTYPE11	'SC_ZENITH_ANG'	Label for column 11
TFORM12	'F12.2'	Column 12 format
TTYPE12	'SC_SPIN_AXIS_CRD'	Label for column 12
TFORM13	'F12.2'	Column 13 format
TTYPE13	'PHASE_ANG'	Label for column 13
TFORM14	'F12.2'	Column 14 format
TTYPE14	'AZIMUTH_ANG'	Label for column 14
TFORM15	'F12.2'	Column 15 format
TTYPE15	'SC_RA'	Label for column 15
TFORM16	'F12.2'	Column 16 format
TTYPE16	'SC_DEC'	Label for column 16
TFORM17	'F12.2'	Column 17 format
TTYPE17	'ECLIPTIC_X'	Label for column 17
TFORM18	'F12.2'	Column 18 format
TTYPE18	'ECLIPTIC_Y'	Label for column 18
TFORM19	'F12.2'	Column 19 format
TTYPE19	'ECLIPTIC_Z'	Label for column 19
TFORM20	'F12.2'	Column 20 format
TTYPE20	'STIM_DRIFT1_X'	Label for column 20
TFORM21	'F12.2'	Column 21 format
TTYPE21	'STIM_DRIFT1_Y'	Label for column 21
TFORM22	'F12.2'	Column 22 format
TTYPE22	'STIM_DRIFT2_X'	Label for column 22
TFORM23	'F12.2'	Column 23 format
TTYPE23	'STIM_DRIFT2_Y'	Label for column 23
TFORM24	'F12.2'	Column 24 format
TTYPE24	'DARK_FACTOR'	Label for column 24
TFORM25	'F12.2'	Column 25 format
TTYPE25	'SC_RANGE'	Label for column 25
TFORM26	'F12.2'	Column 26 format
TTYPE26	'SC_ALTITUTDE'	Label for column 26
TFORM27	'F12.2'	Column 27 format
TTYPE27	'UVS_BORESIGHT_RA'	Label for column 27
TFORM28	'F12.2'	Column 28 format
TTYPE28	'UVS_BORESIGHT_DEC'	Label for column 28

FITS Header Keyword	Value	Description
TFORM29	'F12.2'	Column 29 format
TTYPE29	'EARTH_LATITUDE'	Label for column 29
TFORM30	'F12.2'	Column 30 format
TTYPE30	'EARTH_LONGITUDE'	Label for column 30
TFORM31	'F12.2'	Column 31 format
TTYPE31	'EARTH_RANGE'	Label for column 31
TFORM32	'F12.2'	Column 32 format
TTYPE32	'EARTH_ECLIPTIC_X'	Label for column 32
TFORM33	'F12.2'	Column 33 format
TTYPE33	'EARTH_ECLIPTIC_Y'	Label for column 33
TFORM34	'F12.2'	Column 34 format
TTYPE34	'EARTH_ECLIPTIC_Z'	Label for column 34
TFORM35	'F12.2'	Column 35 format
TTYPE35	'MOON_LATITUDE'	Label for column 35
TFORM36	'F12.2'	Column 36 format
TTYPE36	'MOON_LONGITUDE'	Label for column 36
TFORM37	'F12.2'	Column 37 format
TTYPE37	'MOON_RANGE'	Label for column 37
TFORM38	'F12.2'	Column 38 format
TTYPE38	'MOON_ECLIPTIC_X'	Label for column 38
TFORM39	'F12.2'	Column 39 format
TTYPE39	'MOON_ECLIPTIC_Y'	Label for column 39
TFORM40	'F12.2'	Column 40 format
TTYPE40	'MOON_ECLIPTIC_Z'	Label for column 40
TFORM41	'F12.2'	Column 41 format
TTYPE41	'SUN_LATITUDE'	Label for column 41
TFORM42	'F12.2'	Column 42 format
TTYPE42	'SUN_LONGITUDE'	Label for column 42
TFORM43	'F12.2'	Column 43 format
TTYPE43	'SUN_RANGE'	Label for column 43
TFORM44	'F12.2'	Column 44 format
TTYPE44	'SUN_ECLIPTIC_X'	Label for column 44
TFORM45	'F12.2'	Column 45 format
TTYPE45	'SUN_ECLIPTIC_Y'	Label for column 45
TFORM46	'F12.2'	Column 46 format
TTYPE46	'SUN_ECLIPTIC_Z'	Label for column 46
TFORM47	'F12.2'	Column 47 format
TTYPE47	'IO_LAT'	Label for column 47
TFORM48	'F12.2'	Column 48 format
TTYPE48	'IO_LONG'	Label for column 48
TFORM49	'F12.2'	Column 49 format
TTYPE49	'IO_RANGE'	Label for column 49
TFORM50	'F12.2'	Column 50 format
TTYPE50	'IO_ECLIPTIC_X'	Label for column 50
TFORM51	'F12.2'	Column 51 format
TTYPE51	'IO_ECLIPTIC_Y'	Label for column 51
TFORM52	'F12.2'	Column 52 format
TTYPE52	'IO_ECLIPTIC_Z'	Label for column 52
TFORM53	'F12.2'	Column 53 format

FITS Header Keyword	Value	Description
TTYPE53	'IO_MAG_GSM_X'	Label for column 53
TFORM54	'F12.2'	Column 54 format
TTYPE54	'IO_MAG_GSM_Y'	Label for column 54
TFORM55	'F12.2'	Column 55 format
TTYPE55	'IO_MAG_GSM_Z'	Label for column 55
TFORM56	'F12.2'	Column 56 format
TTYPE56	'IO_LSHELL_COORD'	Label for column 56
TFORM57	'F12.2'	Column 57 format
TTYPE57	'IO_MAG_LONG'	Label for column 57
TFORM58	'F12.2'	Column 58 format
TTYPE58	'IO_FOOTPRINT_N_LAT'	Label for column 58
TFORM59	'F12.2'	Column 59 format
TTYPE59	'IO_FOOTPRINT_N_LONG'	Label for column 59
TFORM60	'F12.2'	Column 60 format
TTYPE60	'IO_FOOTPRINT_S_LAT'	Label for column 60
TFORM61	'F12.2'	Column 61 format
TTYPE61	'IO_FOOTPRINT_S_LONG'	Label for column 61
TFORM62	'F12.2'	Column 62 format
TTYPE62	'EURO_LAT'	Label for column 62
TFORM63	'F12.2'	Column 63 format
TTYPE63	'EURO_LONG'	Label for column 63
TFORM64	'F12.2'	Column 64 format
TTYPE64	'EURO_RANGE'	Label for column 64
TFORM65	'F12.2'	Column 65 format
TTYPE65	'EURO_ECLIPTIC_X'	Label for column 65
TFORM66	'F12.2'	Column 66 format
TTYPE66	'EURO_ECLIPTIC_Y'	Label for column 66
TFORM67	'F12.2'	Column 67 format
TTYPE67	'EURO_ECLIPTIC_Z'	Label for column 67
TFORM68	'F12.2'	Column 68 format
TTYPE68	'EURO_MAG_GSM_X'	Label for column 68
TFORM69	'F12.2'	Column 69 format
TTYPE69	'EURO_MAG_GSM_Y'	Label for column 69
TFORM70	'F12.2'	Column 70 format
TTYPE70	'EURO_MAG_GSM_Z'	Label for column 70
TFORM71	'F12.2'	Column 71 format
TTYPE71	'EURO_LSHELL_COORD'	Label for column 71
TFORM72	'F12.2'	Column 72 format
TTYPE72	'EURO_MAG_LONGITUDE'	Label for column 72
TFORM73	'F12.2'	Column 73 format
TTYPE73	'EURO_FOOTPRINT_N_LAT'	Label for column 73
TFORM74	'F12.2'	Column 74 format
TTYPE74	'EURO_FOOTPRINT_N_LONG'	Label for column 74
TFORM75	'F12.2'	Column 75 format
TTYPE75	'EURO_FOOTPRINT_S_LAT'	Label for column 75
TFORM76	'F12.2'	Column 76 format
TTYPE76	'EURO_FOOTPRINT_S_LONG'	Label for column 76
TFORM77	'F12.2'	Column 77 format
TTYPE77	'GANY_LAT'	Label for column 77

FITS Header Keyword	Value	Description
TFORM78	'F12.2'	Column 78 format
TTYPE78	'GANY_LONG'	Label for column 78
TFORM79	'F12.2'	Column 79 format
TTYPE79	'GANY_RANGE'	Label for column 79
TFORM80	'F12.2'	Column 80 format
TTYPE80	'GANY_ECLIPTIC_X'	Label for column 80
TFORM81	'F12.2'	Column 81 format
TTYPE81	'GANY_ECLIPTIC_Y'	Label for column 81
TFORM82	'F12.2'	Column 82 format
TTYPE82	'GANY_ECLIPTIC_Z'	Label for column 82
TFORM83	'F12.2'	Column 83 format
TTYPE83	'GANY_MAG_GSM_X'	Label for column 83
TFORM84	'F12.2'	Column 84 format
TTYPE84	'GANY_MAG_GSM_Y'	Label for column 84
TFORM85	'F12.2'	Column 85 format
TTYPE85	'GANY_MAG_GSM_Z'	Label for column 85
TFORM86	'F12.2'	Column 86 format
TTYPE86	'GANY_LSHELL_COORD'	Label for column 86
TFORM87	'F12.2'	Column 87 format
TTYPE87	'GANY_MAG_LONGITUDE'	Label for column 87
TFORM88	'F12.2'	Column 88 format
TTYPE88	'GANY_FOOTPRINT_N_LAT'	Label for column 88
TFORM89	'F12.2'	Column 89 format
TTYPE89	'GANY_FOOTPRINT_N_LONG'	Label for column 89
TFORM90	'F12.2'	Column 90 format
TTYPE90	'GANY_FOOTPRINT_S_LAT'	Label for column 90
TFORM91	'F12.2'	Column 91 format
TTYPE91	'GANY_FOOTPRINT_S_LONG'	Label for column 91
TFORM92	'F12.2'	Column 92 format
TTYPE92	'CALL_LAT'	Label for column 92
TFORM93	'F12.2'	Column 93 format
TTYPE93	'CALL_LONG'	Label for column 93
TFORM94	'F12.2'	Column 94 format
TTYPE94	'CALL_RANGE'	Label for column 94
TFORM95	'F12.2'	Column 95 format
TTYPE95	'CALL_ECLIPTIC_X'	Label for column 95
TFORM96	'F12.2'	Column 96 format
TTYPE96	'CALL_ECLIPTIC_Y'	Label for column 96
TFORM97	'F12.2'	Column 97 format
TTYPE97	'CALL_ECLIPTIC_Z'	Label for column 97
TFORM98	'F12.2'	Column 98 format
TTYPE98	'CALL_MAG_GSM_X'	Label for column 98
TFORM99	'F12.2'	Column 99 format
TTYPE99	'CALL_MAG_GSM_Y'	Label for column 99
TFORM100	'F12.2'	Column 100 format
TTYPE100	'CALL_MAG_GSM_Z'	Label for column 100
TFORM101	'F12.2'	Column 101 format
TTYPE101	'CALL_LSHELL_COORD'	Label for column 101
TFORM102	'F12.2'	Column 102 format

FITS Header Keyword	Value	Description
TTYPE102	'CALL_MAG_LONGITUDE'	Label for column 102
TFORM103	'F12.2'	Column 103 format
TTYPE103	'CALL_FOOTPRINT_N_LAT'	Label for column 103
TFORM104	'F12.2'	Column 104 format
TTYPE104	'CALL_FOOTPRINT_N_LONG'	Label for column 104
TFORM105	'F12.2'	Column 105 format
TTYPE105	'CALL_FOOTPRINT_S_LAT'	Label for column 105
TFORM106	'F12.2'	Column 106 format
TTYPE106	'CALL_FOOTPRINT_S_LONG'	Label for column 106
TFORM107	'F12.2'	Column 107 format
TTYPE107	'AMAL_LAT'	Label for column 107
TFORM108	'F12.2'	Column 108 format
TTYPE108	'AMAL_LONG'	Label for column 108
TFORM109	'F12.2'	Column 109 format
TTYPE109	'AMAL_RANGE'	Label for column 109
TFORM110	'F12.2'	Column 110 format
TTYPE110	'AMAL_ECLIPTIC_X'	Label for column 110
TFORM111	'F12.2'	Column 111 format
TTYPE111	'AMAL_ECLIPTIC_Y'	Label for column 111
TFORM112	'F12.2'	Column 112 format
TTYPE112	'AMAL_ECLIPTIC_Z'	Label for column 112
TFORM113	'F12.2'	Column 113 format
TTYPE113	'AMAL_MAG_GSM_X'	Label for column 113
TFORM114	'F12.2'	Column 114 format
TTYPE114	'AMAL_MAG_GSM_Y'	Label for column 114
TFORM115	'F12.2'	Column 115 format
TTYPE115	'AMAL_MAG_GSM_Z'	Label for column 115
TFORM116	'F12.2'	Column 116 format
TTYPE116	'AMAL_LSHELL_COORD'	Label for column 116
TFORM117	'F12.2'	Column 117 format
TTYPE117	'AMAL_MAG_LONGITUDE'	Label for column 117
TFORM118	'F12.2'	Column 118 format
TTYPE118	'AMAL_FOOTPRINT_N_LAT'	Label for column 118
TFORM119	'F12.2'	Column 119 format
TTYPE119	'AMAL_FOOTPRINT_N_LONG'	Label for column 119
TFORM120	'F12.2'	Column 120 format
TTYPE120	'AMAL_FOOTPRINT_S_LAT'	Label for column 120
TFORM121	'F12.2'	Column 121 format
TTYPE121	'AMAL_FOOTPRINT_S_LONG'	Label for column 121
TFORM122	'F12.2'	Column 122 format
TTYPE122	'JUPITER_LAT'	Label for column 122
TFORM123	'F12.2'	Column 123 format
TTYPE123	'JUPITER_LONG'	Label for column 123
TFORM124	'F12.2'	Column 124 format
TTYPE124	'JUPITER_RANGE'	Label for column 124
TFORM125	'F12.2'	Column 125 format
TTYPE125	'JUPITER_ECLIPTIC_X'	Label for column 125
TFORM126	'F12.2'	Column 126 format
TTYPE126	'JUPITER_ECLIPTIC_Y'	Label for column 126

FITS Header Keyword	Value	Description
TFORM127	'F12.2'	Column 127 format
TTYPE127	'JUPITER_ECLIPTIC_Z'	Label for column 127
TFORM128	'F12.2'	Column 128 format
TTYPE128	'JUPITER_MAG_GSM_X'	Label for column 128
TFORM129	'F12.2'	Column 129 format
TTYPE129	'JUPITER_MAG_GSM_Y'	Label for column 129
TFORM130	'F12.2'	Column 130 format
TTYPE130	'JUPITER_MAG_GSM_Z'	Label for column 130
TFORM131	'F12.2'	Column 131 format
TTYPE131	'JUPITER_LSHELL_COORD'	Label for column 131
TFORM132	'F12.2'	Column 132 format
TTYPE132	'JUPITER_MAG_LONGITUDE'	Label for column 132
TFORM133	'F12.2'	Column 133 format
TTYPE133	'JUPITER_FOOTPRINT_N_LAT'	Label for column 133
TFORM134	'F12.2'	Column 134 format
TTYPE134	'JUPITER_FOOTPRINT_N_LONG'	Label for column 134
TFORM135	'F12.2'	Column 135 format
TTYPE135	'JUPITER_FOOTPRINT_S_LAT'	Label for column 135
TFORM136	'F12.2'	Column 136 format
TTYPE136	'JUPITER_FOOTPRINT_S_LONG'	Label for column 136
Extension 2 HDU Data	**Ancillary Data**	**Binary Table**
XTENSION	'BINTABLE'	Extension 3, Calibrated Analog count rates
BITPIX	8	array data type, 8-bit bytes
NAXIS	2	number of array dimensions
NAXIS1	12	Number of bytes per entry
NAXIS2	283822 (*)	Number of count rate entries
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	2	Number of element fields per line
EXTNAME	'Calibrated Analog count rates'	Extension name
EXTVER	1	Extension version number
TTYPE1	'SCLK_TIME'	Spacecraft clock (seconds)
TTYPE2	'COUNT_RATE'	Count rate for the interval (Hz)
TFORM1	'D'	8 byte double
TFORM2	'J'	4 byte int
TDISP1	'D14.3'	Preferred display format for time
TUNIT2	'Hz'	Unit for countrate
END		
Extension 3 HDU Data	**Calibrated Analog Count Rates**	**Data table with 3 values per entry: seconds, subseconds, and count rate**
XTENSION	'BINTABLE'	Extension 4, Calibrated Digital

FITS Header Keyword	Value	Description
		count rates
BITPIX	8	array data type, 8-bit bytes
NAXIS	2	number of array dimensions
NAXIS1	16	Number of bytes per entry
NAXIS2	26995077 (*)	Number of count rate entries
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	3	Number of element fields per line
EXTNAME	'Calibrated Digital Count Rates'	Extension name
EXTVER	1	Extension version number
TTYPE1	'HACK_TIME'	Hack time at the start of interval
TTYPE2	'SCLK_TIME'	Spacecraft clock (seconds)
TTYPE3	'COUNT_RATE'	Count rate for the interval (Hz)
TFORM1	'J'	4 byte integer
TFORM2	'D'	8 byte double
TFORM3	'J'	4 byte integer
TDISP2	'D14.3'	Preferred display format for time
TUNIT2	's'	Unit for spacecraft UTC
TUNIT3	'Hz'	Unit for count rate
END		
Extension 4 HDU Data	**Calibrated Digital Count Rates**	**HK data table, including both the raw values and the values converted into engineering units where applicable.**
XTENSION	'IMAGE'	Pulse Height Distribution (Lyman Alpha)
BITPIX	32	Number of bits per pixel
NAXIS	3	Number of array dimensions
NAXIS1	300	0.1 second bins
NAXIS2	17	17 bins of pulse height information
NAXIS3	904 (*)	Number of histogram images
PCOUNT	0	Extension size parameter
GCOUNT	1	Extension size parameter
BZERO	0	No offset
BSCALE	1	Extension scaling parameter
EXTNAME	'Pulse Height Distribution (Lyman Alpha)'	Extension name
EXTVER	1	Extension version
AMPERR	2*	Number of amplitude values out of range (0-16)
SPECTYPE	'Lyman Alpha'	Spectral range type
SPECCNT	1	Number of SPECMIN/SPECMAX ranges
SPECMIN1	850	Minimum spectral value #1
SPECMAX1	930	Maximum spectral value #1
END		

FITS Header Keyword	Value	Description
Extension 5 HDU Data	**Pulse Height Distribution (Lyman Alpha) histograms**	**300x17xN array of 32 bit event counts**
XTENSION	'IMAGE'	Pulse Height Distribution (Stellar)
BITPIX	32	Number of bits per pixel
NAXIS	3	Number of array dimensions
NAXIS1	300	0.1 second bins
NAXIS2	17	17 bins of pulse height information
NAXIS3	904 (*)	Number of histogram images
PCOUNT	0	Extension size parameter
GCOUNT	1	Extension size parameter
BZERO	0	No offset
BSCALE	1	Extension scaling parameter
EXTNAME	'Pulse Height Distribution (Stellar)'	Extension name
EXTVER	1	Extension version
AMPERR	2*	Number of amplitude values out of range (0-16)
SPECTYPE	'Stellar'	Spectral range type
SPECCNT	1	Number of SPECMIN/SPECMAX ranges
SPECMIN1	931	Minimum spectral value #1
SPECMAX1	1770	Maximum spectral value #1
END		
Extension 6 HDU Data	**Pulse Height Distribution (Stellar) histograms**	**300x17xN array of 32 bit event counts**
XTENSION	'IMAGE'	Pulse Height Distribution (Stim)
BITPIX	32	Number of bits per pixel
NAXIS	3	Number of array dimensions
NAXIS1	300	0.1 second bins
NAXIS2	17	17 bins of pulse height information
NAXIS3	904 (*)	Number of histogram images
PCOUNT	0	Extension size parameter
GCOUNT	1	Extension size parameter
BZERO	0	No offset
BSCALE	1	Extension scaling parameter
EXTNAME	'Pulse Height Distribution (Stim)'	Extension name
EXTVER	1	Extension version
AMPERR	2*	Number of amplitude values out of range (0-16)
SPECTYPE	'Stim	Spectral range type
SPECCNT	2	Number of SPECMIN/SPECMAX ranges
SPECMIN1	0	Minimum spectral value #1
SPECMAX1	149	Maximum spectral value #1

FITS Header Keyword	Value	Description
SPECMIN2	1950	Minimum spectral value #2
SPECMAX2	2047	Maximum spectral value #2
END		
Extension 7 HDU Data	**Pulse Height Distribution (Stim) histograms**	**300x17xN array of 32 bit event counts**
XTENSION	'BINTABLE'	Extension 8: Housekeeping Data
BITPIX	8	Array data type: 8-bit bytes
NAXIS	2	Number of array dimensions
NAXIS1	766	Number of bytes per entry
NAXIS2	14191 (*)	Number of HK packets
PCOUNT	0	
GCOUNT	1	
TFIELDS	144	Number of element fields per line
EXTNAME	'Housekeeping Data'	Full contents of all HK packets
EXTVER	1	Extension version number
CSUMERRS	0*	Number of HK packets with chksum errors
FILE1	‘UVS_2011346180519000_2011346183511999.sfdu’*	Source HK file name
TTYPE1	'SCLK_TIME'	Spacecraft clock (seconds since epoch)
TTYPE2	'HACK_TIME'	Instrument hack time
TTYPE3	'PACK_CNT'	16-bit packet counter
TTYPE4	'PACKET_DATA'	Raw HK packet (340 bytes)
TTYPE5	'INST_STATE'	Instrument State (0=off; 1=checkout; 2=safe; 3=acq; 4=decon)
TTYPE6	'SAFETY_ACTIVE'	1=safety active
TTYPE7	'LAST_SAFETY'	Last safety (0=none)
TTYPE8	'LVPS_STATUS'	Power status for each LVPS; 1=active
TTYPE9	'HVPS_STATUS'	Power status for each HVPS; 1=active
TTYPE10	'DETECTOR_PWR'	Power status of detector; 1=on
TTYPE11	'TURN_OFF_REQ'	1=request instrument shutdown by s/c
TTYPE12	'WPA_DRIVEN'	1=WPA activated
TTYPE13	'WPA_SWITCH'	1=WPA stroke switch activated
TTYPE14	'HVPS_SAFE'	Safing status for each HVPS; 1=safing plug installed
TTYPE15	'RST_ACT_SAFE'	Resettable actuator safing plug status; 1=installed
TTYPE16	'NON_RST_ACT_SAFE'	Non-resettable actuator safing plus status; 1=installed
TTYPE17	'SCAN_MRR_HTR'	Status of scan mirror heater; 1=on
TTYPE18	'OAP_MRR_HTR'	Status of the OAP mirror

FITS Header Keyword	Value	Description
		heater; 1=on
TTYPE19	'GRT_MRR_HTR'	Status of the grating mirror heater; 1=on
TTYPE20	'CMD_LAST_CYCLE'	1=command received during last cycle
TTYPE21	'T_SYNC_MSG'	1=valid time sync message received during last cycle
TTYPE22	'T_SYNC_PULSE'	1=valid time sync pulse received during last cycle
TTYPE23	'CRIT_TC_PEND'	1=critical telecommand pending
TTYPE24	'PRIMARY_TC_STAT'	1=enabled
TTYPE25	'REDUNDANT_TC_STAT'	1=enabled
TTYPE26	'CMDS_ACCEPTED'	Modulo 2^8 count of commands accepted
TTYPE27	'CMDS_REJECTED'	Modulo 2^8 count of commands rejected
TTYPE28	'CMDS_EXECUTED'	Modulo 2^8 count of commands executed
TTYPE29	'TIME_MSGS_RECVD'	Modulo 2^8 count of time messages received
TTYPE30	'TIME_PULSES_RECVD'	Modulo 2^8 count of time pulses received
TTYPE31	'NADIR_MSGS_RECVD'	Modulo 2^8 count of nadir messages received
TTYPE32	'LAST_ACCEPT_CMD'	Opcode of last accepted command
TTYPE33	'LAST_FAILED_CMD'	Opcode of last failed command
TTYPE34	'LAST_FAILURE'	Last failure code command/execution
TTYPE35	'CRIT_CMD_TIMEOUT'	Remaining timeout for a critical command
TTYPE36	'SCI_PKT_HDR'	Header of the most recently acquired science packet
TTYPE37	'SCI_QUALITY'	Quality byte of the most recent science acquisition
TTYPE38	'SCI_PKT_TAG'	Tag bytes of most recent science acquisition
TTYPE39	'DETECTOR_DOOR_POS'	0=illegal; 1=not open; 2=open; 3=illegal
TTYPE40	'APERTURE_DOOR_POS'	0=error; 1=closed; 2=open; 3=between
TTYPE41	'HACKRATE'	0=1ms; 1=2ms; ... 9=512ms
TTYPE42	'HVPS_COMMANDED'	Commanded state of HVPS 1 and 2; 1=on
TTYPE43	'HVPS_LIMITED'	1=HVPS limited due to high countrate
TTYPE44	'HOT_PIXEL_MASKING'	1=hot pixel masking (hardware) active
TTYPE45	'SCI_OVERFLOW'	1=overflow occurred in high

FITS Header Keyword	Value	Description
		speed science transfer
TTYPE46	'ACQ_MEM'	0=side A; 1=side B
TTYPE47	'DETECTOR_STIM'	0=STIM off; 1=STIM on
TTYPE48	'ACQ_EVT_POINTER'	Most recent value of the h/w pixel list pointer
TTYPE49	'FIRST_COUNT_HACK'	Value of the timehack counter at the first countrate entry
TTYPE50	'RAW_EVENT_COUNT'	Current value of the hardware detector analog event counter
TTYPE51	'MAX_EVENT_RATE'	Maximum digital unmasked event rate in the last HK cycle
TTYPE52	'MAX_MASK_RATE'	Maximum digital masking rate in the last HK cycle
TTYPE53	'ACQ_TIMEOUT'	Remaining time (sec) of acquisition timeout counter
TTYPE54	'LAST_ACQ_COMPLETE_TIME'	Time of last acquisition completion
TTYPE55	'LOWER_DISCRIMINATOR'	Pulse height (0-31)
TTYPE56	'UPPER_DISCRIMINATOR'	Pulse height (0-31)
TTYPE57	'HVPS_SETPOINT'	DAC counts
TTYPE58	'HVPS_LIMIT_TIMEOUT'	Remaining HVPS limit timeout in cycles
TTYPE59	'MAX_MCP_VOLTAGE'	Maximum MCP voltage in this HK reporting period
TTYPE60	'MIN_MCP_VOLTAGE'	Minimum MCP voltage in this HK reporting period
TTYPE61	'MAX_ANODE_VOLTAGE'	Maximum anode voltage in this HK reporting period
TTYPE62	'MIN_ANODE_VOLTAGE'	Minimum anode voltage in this HK reporting period
TTYPE63	'MAX_STRIP_CURRENT'	Maximum strip current in this HK reporting period
TTYPE64	'MIN_STRIP_CURRENT'	Minimum strip current in this HK reporting period
TTYPE65	'P7_VOLT'	ADC counts; range matching measure voltage
TTYPE66	'N7_VOLT'	ADC counts; range matching measure voltage
TTYPE67	'P5_VOLT'	ADC counts; range matching measure voltage
TTYPE68	'N5_VOLT'	ADC counts; range matching measure voltage
TTYPE69	'P3_3_VOLT'	ADC counts; range matching measure voltage
TTYPE70	'P1_8_VOLT'	ADC counts; range matching measure voltage
TTYPE71	'P1_5_VOLT'	ADC counts; range matching measure voltage
TTYPE72	'REF_0_3_VOLT'	ADC counts; range matching measure voltage

FITS Header Keyword	Value	Description
TTYPE73	'REF_2_7_VOLT'	ADC counts; range matching measure voltage
TTYPE74	'SEQUENCER_ACTIVE'	1=scan mirror sequencer active
TTYPE75	'CURRENT_POSITION'	Current scan mirror position
TTYPE76	'END_SWTICHES_STAT'	1=switch closed
TTYPE77	'TIME_TO_ZENITH'	Remaining time to zenith in sec*2
TTYPE78	'CURRENT_PHASE'	Current phase within scan table
TTYPE79	'REM_PHASE_TIME'	Time remaining in current phase in sec*2
TTYPE80	'ACT_SEQ_OFFSET'	Offset within the current sequence phase
TTYPE81	'ACT_SEQ_STEP'	Step within the current sequence phase
TTYPE82	'ACT_SEQ_CYCLE'	Cycles within the current sequence step phase
TTYPE83	'REM_DWELL'	Remaining number of dwell cycles at the current position
TTYPE84	'SCAN_MRR_HTR_SETPOINT'	ADC counts
TTYPE85	'OAP_MRR_HTR_SETPOINT'	ADC counts
TTYPE86	'GRATING_HTR_SETPOINT'	ADC counts
TTYPE87	'SCAN_MRR_PRIMARY_TMP'	ADC counts
TTYPE88	'SCAN_MRR_SECONDARY_TMP'	ADC counts
TTYPE89	'OAP_MRR_PRIMARY_TMP'	ADC counts
TTYPE90	'OAP_MRR_SECONDARY_TMP'	ADC counts
TTYPE91	'GRATING_PRIMARY_TMP'	ADC counts
TTYPE92	'GRATING_SECONDARY_TMP'	ADC counts
TTYPE93	'CDH_ELEC_TMP'	ADC counts
TTYPE94	'HVPS_TEMP'	ADC counts
TTYPE95	'LVPS_TEMP'	ADC counts
TTYPE96	'DETECTOR_BDY_TMP'	ADC counts
TTYPE97	'DETECTOR_ELEC_TMP'	ADC counts
TTYPE98	'SMIB_TEMP'	ADC counts
TTYPE99	'CHASSIS_TEMP'	ADC counts
TTYPE100	'HVPS_LIMIT_CYCLES'	Number of remaining cycles in this acquisition
TTYPE101	'TEMP_SAFETY'	1=safety in effect
TTYPE102	'CYCLE_SAFETY'	1=safety in effect
TTYPE103	'ANODE_SAFETY'	1=safety in effect
TTYPE104	'STRIP_SAFETY'	1=safety in effect
TTYPE105	'HV_SAFETY'	1=safety in effect
TTYPE106	'BRIGHT_SAFETY'	1=safety in effect
TTYPE107	'UNSAFE_TIMER'	Remaining unsafe period in seconds; 0=no safety active
TTYPE108	'SAFETY_OVERRIDE'	1=all safety handling is overridden (deactivated)
TTYPE109	'TEMP_SAFETY_MASK'	1=masked
TTYPE110	'CYCLE_SAFETY_MASK'	1=masked

FITS Header Keyword	Value	Description
TTYPE111	'ANODE_SAFETY_MASK'	1=masked
TTYPE112	'STRIP_SAFETY_MASK'	1=masked
TTYPE113	'HV_SAFETY_MASK'	1=masked
TTYPE114	'BRIGHT_SAFETY_MASK'	1=masked
TTYPE115	'EXECUTING_CODE'	0=illegal; 1=PROM; ...; 5=RAM; ...; 11-14=EEPROM_1-4
TTYPE116	'HW_VERSION'	Board version ID
TTYPE117	'SW_MAJOR_VER'	Build Number
TTYPE118	'SW_MINOR_VER'	Version Number
TTYPE119	'TC_INT_OFF'	Interrupt disable for each TC receiver; 1=disabled
TTYPE120	'SYNC_RECVD'	TSP received in last second for each TC receiver; 1=received
TTYPE121	'TC_FRAME_ERR'	Latched H/W frame error status for each TC receiver; 1=error
TTYPE122	'TC_OVERRUN_ERR'	Latched H/W frame error status for each TC rcvr; 1=overrun
TTYPE123	'MEM_CHKSUM'	Checksum calculated in response to last issued check mem cmd
TTYPE124	'RTX_IDLE'	Count of passes through the scheduler idle loop
TTYPE125	'RTX_SCHEDULER'	Count of calls to scheduler
TTYPE126	'DEBUG_ARRAY'	Various debug information fields
TTYPE127	'MIN_FREE_STACK'	Minimum amount of free stack space detected
TTYPE128	'FIRST_DELETED'	Task number of the first deleted task
TTYPE129	'RAM_EDAC_RECOVER'	Number of recovered RAM errors
TTYPE130	'RAM_EDAC_FAIL'	Number of detected RAM errors
TTYPE131	'EEPROM_EDAC_RECOVER'	Number of recovered EEPROM errors
TTYPE132	'EEPROM_EDAC_FAIL'	Number of detected EEPROM errors
TTYPE133	'TEST_STATUS'	Test result of commanded self test
TTYPE134	'SCRUBBER_CYCLES'	Number of EDAC scrubber cycles completed
TTYPE135	'SLOW_TASK_STATUS'	0=start;1=idle;2=mem chk;3=mem dump;4=mem load;5=acq;6=test
TTYPE136	'WATCHDOG_CNT_MAXED'	Watchdog expiration count above 15
TTYPE137	'WATCHDOG_EXP_COUNT'	Number of watchdog

FITS Header Keyword	Value	Description
		expirations since last power-on; mod16
TTYPE138	'PARAMETER_INDEX'	Last requested parameter index
TTYPE139	'PARAMETER_VALUE'	Current value of last requested parameter
TTYPE140	'HK_PKT_CHKSUM'	Calculated checksum before sending HK data to S/C
TYPE141	‘CLOCK_PERIOD’	Clock period assigned to HK packet
TYPE142	‘CHKSUM_ERROR’	Difference between computed and expected packet chksum
TYPE143	‘AVR_RAW_RATE’	Average raw countrate in Hz
TYPE144	‘AVR_EVENT_RATE’	Average event rate in Hz
TFORM1	'D '	8 byte double
TFORM2	'J '	4 byte integer
TFORM3	'I '	2 byte integer
TFORM4	'340B '	340 bytes
TFORM5	'B '	1 byte
TFORM6	'B '	1 byte
TFORM7	'B '	1 byte
TFORM8	'B '	1 byte
TFORM9	'B '	1 byte
TFORM10	'B '	1 byte
TFORM11	'B '	1 byte
TFORM12	'B '	1 byte
TFORM13	'B '	1 byte
TFORM14	'B '	1 byte
TFORM15	'B '	1 byte
TFORM16	'B '	1 byte
TFORM17	'B '	1 byte
TFORM18	'B '	1 byte
TFORM19	'B '	1 byte
TFORM20	'B '	1 byte
TFORM21	'B '	1 byte
TFORM22	'B '	1 byte
TFORM23	'B '	1 byte
TFORM24	'B '	1 byte
TFORM25	'B '	1 byte
TFORM26	'B '	1 byte
TFORM27	'B '	1 byte
TFORM28	'B '	1 byte
TFORM29	'B '	1 byte
TFORM30	'B '	1 byte
TFORM31	'B '	1 byte
TFORM32	'B '	1 byte
TFORM33	'B '	1 byte
TFORM34	'B '	1 byte
TFORM35	'B '	1 byte

FITS Header Keyword	Value	Description
TFORM36	'J '	4 bytes
TFORM37	'B '	1 byte
TFORM38	'I '	2 bytes
TFORM39	'B '	1 byte
TFORM40	'B '	1 byte
TFORM41	'B '	1 byte
TFORM42	'B '	1 byte
TFORM43	'B '	1 byte
TFORM44	'B '	1 byte
TFORM45	'B '	1 byte
TFORM46	'B '	1 byte
TFORM47	'B '	1 byte
TFORM48	'I '	2 bytes
TFORM49	'I '	2 byte int
TFORM50	'J '	4 byte int
TFORM51	'I '	2 byte int
TFORM52	'I '	2 byte int
TFORM53	'I '	2 byte int
TFORM54	'J '	4 byte int
TFORM55	'B '	1 byte
TFORM56	'B '	1 byte
TFORM57	'B '	1 byte
TFORM58	'B '	1 byte
TFORM59	'B '	1 byte
TFORM60	'B '	1 byte
TFORM61	'B '	1 byte
TFORM62	'B '	1 byte
TFORM63	'B '	1 byte
TFORM64	'B '	1 byte
TFORM65	'B '	1 byte
TFORM66	'B '	1 byte
TFORM67	'B '	1 byte
TFORM68	'B '	1 byte
TFORM69	'B '	1 byte
TFORM70	'B '	1 byte
TFORM71	'B '	1 byte
TFORM72	'B '	1 byte
TFORM73	'I '	2 byte int
TFORM74	'B '	1 byte
TFORM75	'B '	1 byte
TFORM76	'B '	1 byte
TFORM77	'B '	1 byte
TFORM78	'B '	1 byte
TFORM79	'I '	2 byte int
TFORM80	'B '	1 byte
TFORM81	'B '	1 byte
TFORM82	'B '	1 byte
TFORM83	'B '	1 byte
TFORM84	'D '	8 byte

FITS Header Keyword	Value	Description
TFORM85	'D '	8 byte
TFORM86	'D '	8 byte
TFORM87	'D '	8 byte
TFORM88	'D '	8 byte
TFORM89	'D '	8 byte
TFORM90	'D '	8 byte
TFORM91	'D '	8 byte
TFORM92	'D '	8 byte
TFORM93	'D '	8 byte
TFORM94	'D '	8 byte
TFORM95	'D '	8 byte
TFORM96	'D '	8 byte
TFORM97	'D '	8 byte
TFORM98	'D '	8 byte
TFORM99	'D '	8 byte
TFORM100	'B '	1 byte
TFORM101	'B '	1 byte
TFORM102	'B '	1 byte
TFORM103	'B '	1 byte
TFORM104	'B '	1 byte
TFORM105	'B '	1 byte
TFORM106	'B '	1 byte
TFORM107	'I '	2 byte int
TFORM108	'B '	1 byte
TFORM109	'B '	1 byte
TFORM110	'B '	1 byte
TFORM111	'B '	1 byte
TFORM112	'B '	1 byte
TFORM113	'B '	1 byte
TFORM114	'B '	1 byte
TFORM115	'B '	1 byte
TFORM116	'B '	1 byte
TFORM117	'B '	1 byte
TFORM118	'B '	1 byte
TFORM119	'B '	1 byte
TFORM120	'B '	1 byte
TFORM121	'B '	1 byte
TFORM122	'B '	1 byte
TFORM123	'I '	2 bytes
TFORM124	'I '	2 byte int
TFORM125	'I '	2 byte int
TFORM126	'10B '	10 bytes
TFORM127	'B '	1 byte
TFORM128	'B '	1 byte
TFORM129	'B '	1 byte
TFORM130	'B '	1 byte
TFORM131	'B '	1 byte
TFORM132	'B '	1 byte
TFORM133	'I '	2 bytes

FITS Header Keyword	Value	Description
TFORM134	'I '	2 byte int
TFORM135	'B '	1 byte
TFORM136	'B '	1 byte
TFORM137	'B '	1 byte
TFORM138	'B '	1 byte
TFORM139	'B '	1 byte
TFORM140	'I '	2 bytes
TFORM141	‘J ‘	4 byte integer
TFORM142	‘I ‘	2 byte integer
TFORM143	‘J ‘	4 byte integer
TFORM144	‘J ‘	4 byte integer
TDISP1	‘D14.3’	format
TDISP57	‘F6.3’	format
TDISP59	‘F6.3’	format
TDISP60	‘F6.3’	format
TDISP61	‘F4.0’	format
TDISP62	‘F4.0’	format
TDISP63	‘F5.2’	format
TDISP64	‘F5.2’	format
TDISP65	‘F5.2’	format
TDISP66	‘F5.2’	format
TDISP67	‘F5.2’	format
TDISP68	‘F5.2’	format
TDISP69	‘F5.2’	format
TDISP70	‘F5.2’	format
TDISP71	‘F5.2’	format
TDISP72	‘F5.2’	format
TDISP73	‘F5.2’	format
TDISP84	‘F5.2’	format
TDISP85	'F5.1'	format
TDISP86	'F5.1'	format
TDISP87	'F5.1'	format
TDISP88	'F5.1'	format
TDISP89	'F5.1'	format
TDISP90	'F5.1'	format
TDISP91	'F5.1'	format
TDISP92	'F5.1'	format
TDISP93	'F5.1'	format
TDISP94	'F5.1'	format
TDISP95	'F5.1'	format
TDISP96	'F5.1'	format
TDISP97	'F5.1'	format
TDISP98	'F5.1'	format
TDISP99	'F5.1'	format
TUNIT143	‘Hz’	
TUNIT144	‘Hz’	
TZERO3	32768	
TZERO38	32768	
TZERO49	32768	

FITS Header Keyword	Value	Description
TZERO123	32768	
TZERO133	32768	
TZERO134	32768	
TZERO140	32768	
END		
Extension 8	**Housekeeping Table**	**HK data table, including both the raw values and the values converted into engineering units where applicable.**
XTENSION	'IMAGE'	Extension 9, Wavelength lookup image
BITPIX	-32	array data type, 32 bit words
NAXIS	2	number of array dimensions
NAXIS1	2048	number of spectral channels
NAXIS2	256	number of spatial channels
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
EXTNAME	'Wavelength Lookup Image'	Extension name
EXTVER	1	Extension version number
END		
Extension 9:	**Wavelength Lookup Image**	**2048x256 image where every pixel value is the wavelength (in Angstroms) associated with the pixel.**
XTENSION	'TABLE'	Extension 10, Mask Information
BITPIX	8	array data type, 8-bit bytes
NAXIS	2	number of array dimensions
NAXIS1	170	number of characters per line
NAXIS2	220 (*)	number of position records
PCOUNT	0	extension size parameter
GCOUNT	1	extension size parameter
TFIELDS	35	Number of element fields per line
EXTNAME	'Mask Information'	Extension name
EXTVER	1	Extension version number
TFORM1	'A8'	Format of field 1
TFORM2	'A18'	Format of field 2
TFORM3	'A18'	Format of field 3
TFORM4	'I4'	Format of field 4
TFORM5	'I4'	Format of field 5
TFORM6	'I4'	Format of field 6
TFORM7	'I4'	Format of field 7
TFORM8	'I4'	Format of field 8
TFORM9	'I4'	Format of field 9
TFORM10	'I4'	Format of field 10
TFORM11	'I4'	Format of field 11
TFORM12	'I4'	Format of field 12
TFORM13	'I4'	Format of field 13

FITS Header Keyword	Value	Description
TFORM14	'I4'	Format of field 14
TFORM15	'I4'	Format of field 15
TFORM16	'I4'	Format of field 16
TFORM17	'I4'	Format of field 17
TFORM18	'I4'	Format of field 18
TFORM19	'I4'	Format of field 19
TFORM20	'I4'	Format of field 20
TFORM21	'I4'	Format of field 21
TFORM22	'I4'	Format of field 22
TFORM23	'I4'	Format of field 23
TFORM24	'I4'	Format of field 24
TFORM25	'I4'	Format of field 25
TFORM26	'I4'	Format of field 26
TFORM27	'I4'	Format of field 27
TFORM28	'I4'	Format of field 28
TFORM29	'I4'	Format of field 29
TFORM30	'I4'	Format of field 30
TFORM31	'I4'	Format of field 31
TFORM32	'I4'	Format of field 32
TFORM33	'I4'	Format of field 33
TFORM34	'I4'	Format of field 34
TFORM35	'I4'	Format of field 35
TBCOL1	1	Start of column for field 1
TBCOL2	9	Start of column for field 2
TBCOL3	26	Start of column for field 3
TBCOL4	43	Start of column for field 4
TBCOL5	47	Start of column for field 5
TBCOL6	51	Start of column for field 6
TBCOL7	55	Start of column for field 7
TBCOL8	59	Start of column for field 8
TBCOL9	63	Start of column for field 9
TBCOL10	67	Start of column for field 10
TBCOL11	71	Start of column for field 11
TBCOL12	75	Start of column for field 12
TBCOL13	79	Start of column for field 13
TBCOL14	83	Start of column for field 14
TBCOL15	87	Start of column for field 15
TBCOL16	91	Start of column for field 16
TBCOL17	95	Start of column for field 17
TBCOL18	99	Start of column for field 18
TBCOL19	103	Start of column for field 19
TBCOL20	107	Start of column for field 20
TBCOL21	111	Start of column for field 21
TBCOL22	115	Start of column for field 22
TBCOL23	119	Start of column for field 23
TBCOL24	123	Start of column for field 24
TBCOL25	127	Start of column for field 25
TBCOL26	131	Start of column for field 26
TBCOL27	135	Start of column for field 27

FITS Header Keyword	Value	Description
TBCOL28	139	Start of column for field 28
TBCOL29	143	Start of column for field 29
TBCOL30	147	Start of column for field 30
TBCOL31	151	Start of column for field 31
TBCOL32	155	Start of column for field 32
TBCOL33	159	Start of column for field 33
TBCOL34	163	Start of column for field 34
TBCOL35	167	Start of column for field 35
TTYPE1	'MASK_NAME'	Name assigned to mask
TTYPE2	'START_TIME'	Start time for mask
TTYPE3	'END_TIME'	End time for mask
TTYPE4	'MSK1_SPEC_START'	Mask1 Spectral Start
TTYPE5	'MSK1_SPEC_STOP'	Mask1 Spectral Stop
TTYPE6	'MSK2_SPEC_START'	Mask2 Spectral Start
TTYPE7	'MSK2_SPEC_STOP'	Mask2 Spectral Stop
TTYPE8	'MSK3_SPEC_START'	Mask3 Spectral Start
TTYPE9	'MSK3_SPEC_STOP'	Mask3 Spectral Stop
TTYPE10	'MSK4_SPEC_START'	Mask4 Spectral Start
TTYPE11	'MSK4_SPEC_STOP'	Mask4 Spectral Stop
TTYPE12	'MSK5_SPEC_START'	Mask5 Spectral Start
TTYPE13	'MSK5_SPEC_STOP'	Mask5 Spectral Stop
TTYPE14	'MSK6_SPEC_START'	Mask6 Spectral Start
TTYPE15	'MSK6_SPEC_STOP'	Mask6 Spectral Stop
TTYPE16	'MSK7_SPEC_START'	Mask7 Spectral Start
TTYPE17	'MSK7_SPEC_STOP'	Mask7 Spectral Stop
TTYPE18	'MSK8_SPEC_START'	Mask8 Spectral Start
TTYPE19	'MSK8_SPEC_STOP'	Mask8 Spectral Stop
TTYPE20	'MSK1_SPAT_START'	Mask1 Spatial Start
TTYPE21	'MSK1_SPAT_STOP'	Mask1 Spatial Stop
TTYPE22	'MSK2_SPAT_START'	Mask2 Spatial Start
TTYPE23	'MSK2_SPAT_STOP'	Mask2 Spatial Stop
TTYPE24	'MSK3_SPAT_START'	Mask3 Spatial Start
TTYPE25	'MSK3_SPAT_STOP'	Mask3 Spatial Stop
TTYPE26	'MSK4_SPAT_START'	Mask4 Spatial Start
TTYPE27	'MSK4_SPAT_STOP'	Mask4 Spatial Stop
TTYPE28	'MSK5_SPAT_START'	Mask5 Spatial Start
TTYPE29	'MSK5_SPAT_STOP'	Mask5 Spatial Stop
TTYPE30	'MSK6_SPAT_START'	Mask6 Spatial Start
TTYPE31	'MSK6_SPAT_STOP'	Mask6 Spatial Stop
TTYPE32	'MSK7_SPAT_START'	Mask7 Spatial Start
TTYPE33	'MSK7_SPAT_STOP'	Mask7 Spatial Stop
TTYPE34	'MSK8_SPAT_START'	Mask8 Spatial Start
TTYPE35	'MSK8_SPAT_STOP'	Mask8 Spatial Stop
END		
Extension 10:	**Mask Information**	**Mask Information Data Table**

APPENDIX B – GLOSSARY

Archive – An archive consists of one or more data sets along with all the documentation and ancillary information needed to understand and use the data. An archive is a logical construct independent of the medium on which it is stored.

Archive Volume, Archive Volume Set – A volume is a unit of media on which data products are stored; for example, one CD-ROM or DVD-ROM. An *archive volume* is a volume containing all or part of an archive; that is, data products plus documentation and ancillary files. When an archive spans multiple volumes, they are called an *archive volume set*. Usually the documentation and some ancillary files are repeated on each volume of the set, so that a single volume can be used alone.

Catalog Information – Descriptive information about a data set (e.g. mission description, spacecraft description, instrument description), expressed in Object Description Language (ODL) which is suitable for loading into a PDS catalog.

Data Product – A labeled grouping of data resulting from a scientific observation, usually stored in one file. A product label identifies, describes, and defines the structure of the data. An example of a data product is a planetary image, a spectrum table, or a time series table.

Data Set – An accumulation of data products. A data set together with supporting documentation and ancillary files is an archive.

Standard Data Product – A data product generated in a predefined way using well-understood procedures, processed in "pipeline" fashion. Data products that are generated in a nonstandard way are sometimes called *special data products*.

APPENDIX C – ACRONYMS AND ABBREVIATIONS

ASCII	American Standard Code for Information Interchange
C&DH	Command and Data Handling
CODMAC	Committee on Data Management, Archiving and Computing
DVD-ROM	Digital Video Disk – Read-Only Memory
EDR	Experiment Data Record
FITS	Flexible Image Transport System
HDU	Header and Data Unit (FITS)
HK	Housekeeping
HVPS	High-Voltage Power Supply
HW	Hardware
IAU	International Astronomical Union
ICD	Interface Control Document
IDL	Interactive Data Language
ISO	International Standards Organization
JPL	Jet Propulsion Laboratory
LAMP	Lyman Alpha Mapping Project
LRO	Lunar Reconnaissance Orbiter
MCP	Microchannel Plate
MOC	Mission Operations Center
MSB	Most Significant Bit
NAIF	Navigation and Ancillary Information Facility
NASA	National Aeronautics and Space Administration
PDS	Planetary Data System
SCLK	Spacecraft Clock (SPICE kernel)
SCUT	Spacecraft Universal Time
SIS	Software Interface Specification
SOC	Science Operations Center
SPICE	Spacecraft, Planet, Instrument, C-matrix (pointing), and Events
STIM	Stimulator, for UVS a detector electronics integrated test/fiducial generator
TBD	To Be Determined
TBS	To Be Supplied
UTC	Coordinated Universal Time
UV	Ultraviolet
UVS	Ultraviolet Spectrograph
XDL	Cross Delay Line

APPENDIX D – NASA AND CODMAC DATA LEVEL DEFINITIONS

NASA	CODMAC	Description
Packet data	Raw - Level 1	Telemetry data stream as received at the ground station, with science and engineering data embedded.
Level 0	Edited - Level 2	Instrument science data (e.g., raw voltages, counts) at full resolution, time ordered, with duplicates and transmission errors removed.
Level 1A	Calibrated - Level 3	NASA Level 0 data that have been located in space and may have been transformed (e.g., calibrated, rearranged) in a reversible manner and packaged with needed ancillary and auxiliary data (e.g., radiances with the calibration equations applied).
Level 1B	Resampled - Level 4	Irreversibly transformed (e.g., resampled, remapped, calibrated) values of the instrument measurements (e.g., radiances, magnetic field strength).
Level 1C	Derived - Level 5	NASA Level 1A or 1B data that have been resampled and mapped onto uniform space-time grids. The data are calibrated (i.e., radiometrically corrected) and may have additional corrections applied (e.g., terrain correction).
Level 2	Derived - Level 5	Geophysical parameters, generally derived from Level 1 data, and located in space and time commensurate with instrument location, pointing, and sampling.
Level 3	Derived - Level 5	Geophysical parameters mapped onto uniform space-time grids.

APPENDIX E – SAMPLE UVS LABEL FILES

Below is an example PDS label for the UVS RDR data product

```
PDS_VERSION_ID            = PDS3
DD_VERSION_ID             = PDSCAT1R65
LABEL_REVISION_NOTE       = "2010-08-09, Brad Trantham (SwRI), V1.0;"

/* FILE CHARACTERISTIC DATA ELEMENTS */

DATA_FORMAT               = FITS
FILE_NAME                 = "UVS_S01_434589840_2013282_efbobs_V01.FIT"
FILE_RECORDS              = 632710
RECORD_BYTES              = 2880 /* FITS standard record length */
RECORD_TYPE               = FIXED_LENGTH

/* DATA OBJECT POINTERS */

^CALIBRATED_SPECTRAL_HEADER       =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 1)
^CALIBRATED_SPECTRAL_IMAGE        =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 5)
^ACQUISITION_LIST_HEADER          =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 1462)
^ACQUISITION_LIST_TABLE           =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 1465)
^CALIBRATED_PHOTON_LIST_HEADER    =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 1514)
^CALIBRATED_PHOTON_LIST_TABLE     =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 1516)
^ANCILLARY_DATA_HEADER            =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 605984)
^ANCILLARY_DATA_TABLE             =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 605992)
^CALIBRATED_ANALOG_COUNT_RATE_HEADER =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 606768)
^CALIBRATED_ANALOG_COUNT_RATE_TABLE  =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 606769)
^CALIBRATED_DIGITAL_COUNT_RATE_HEADER=
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 606948)
^CALIBRATED_DIGITAL_COUNT_RATE_TABLE =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 606949)
^HOUSEKEEPING_HEADER              =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 630665)
^HOUSEKEEPING_TABLE               =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 630676)
^WAVELENGTH_LOOKUP_HEADER         =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 631248)
^WAVELENGTH_LOOKUP_IMAGE          =
 ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 631249)
```

```
^MASK_INFORMATION_HEADER           =
  ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 632706)
^MASK_INFORMATION_TABLE            =
  ("UVS_S01_434589840_2013282_efbobs_V01.FIT", 632709)

/* IDENTIFICATION DATA ELEMENTS */

DATA_SET_ID               = "JNO-J-UVS-3-RDR-V1.0"
INSTRUMENT_HOST_NAME      = "JUNO"
INSTRUMENT_NAME           = "ULTRAVIOLET SPECTROGRAPH"
PRODUCT_CREATION_TIME     = 2014-112T18:01:05
PRODUCT_ID                = "UVS_S01_434589840_2013282_efbobs_V01.FIT"
STANDARD_DATA_PRODUCT_ID  = "UVS_SCI"
MD5_CHECKSUM              = "ddea148975d560543c4ff970bce0cde8"
SPACECRAFT_CLOCK_START_COUNT = "434589949.564"
SPACECRAFT_CLOCK_STOP_COUNT  = "434619259.734"
START_TIME                = 2013-282T11:24:45.564
STOP_TIME                 = 2013-282T19:33:16.733
TARGET_NAME               = "JUPITER"

/* DESCRIPTIVE DATA ELEMENTS */

DATA_SET_NAME             = "JUNO JUPITER UVS 3 REDUCED DATA RECORD V1.0"
PROCESSING_LEVEL_ID       = "3"
INSTRUMENT_ID             = "UVS"
INSTRUMENT_TYPE           = "ULTRAVIOLET SPECTROMETER"
PRODUCER_FULL_NAME        = "BRAD TRANTHAM"
PRODUCER_ID               = "JUNO_UVS"
PRODUCER_INSTITUTION_NAME = "SOUTHWEST RESEARCH INSTITUTE"
PRODUCT_TYPE              = "RDR" /* CODMAC Data Level 3 */
SOFTWARE_NAME             = "UVS-MIKE"
SPACECRAFT_NAME           = "JUNO"
TARGET_TYPE               = "PLANET"

/* DATA OBJECT DEFINITIONS */

OBJECT                    = CALIBRATED_SPECTRAL_HEADER
  BYTES                   = 11520 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE             = FITS
  INTERCHANGE_FORMAT      = ASCII
  RECORDS                 = 4
  DESCRIPTION             = "
    FITS header for JUNO UVS calibrated (CODMAC Data Level 3) observation."
END_OBJECT                = CALIBRATED_SPECTRAL_HEADER

OBJECT                    = CALIBRATED_SPECTRAL_IMAGE
  SAMPLE_BITS             = 32
  SAMPLE_TYPE             = MSB_INTEGER
  AXIS_ORDER_TYPE         = FIRST_INDEX_FASTEST
```

```
  LINE_DISPLAY_DIRECTION     = UP
  SAMPLE_DISPLAY_DIRECTION   = RIGHT
  LINE_SAMPLES               = 2048
  LINES                      = 256
  INTERCHANGE_FORMAT         = BINARY
  OFFSET                     = 0
  SCALING_FACTOR             = 1.00000
  DESCRIPTION                = "
    This is a reconstructed histogram generated from the photon list data in
    the science data file. Photon acquisition events will be binned according
    to their spectral and spatial components. This summary image is used as a
    quick-look check on data quality."
END_OBJECT                   = CALIBRATED_SPECTRAL_IMAGE

OBJECT                       = ACQUISITION_LIST_HEADER
  BYTES                      = 8640 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE                = FITS
  INTERCHANGE_FORMAT         = ASCII
  RECORDS                    = 3
  DESCRIPTION                = "
    This is the FITS header for FITS extension number = 1, FITS extension name
    = ACQUISITION_LIST"
END_OBJECT                   = ACQUISITION_LIST_HEADER

OBJECT                       = ACQUISITION_LIST_TABLE
  INTERCHANGE_FORMAT         = ASCII
  ROWS                       = 750
  COLUMNS                    = 20
  ROW_BYTES                  = 185
  OBJECT                     = COLUMN
    NAME                     = "FRAME_COUNTER"
    COLUMN_NUMBER            = 1
    DATA_TYPE                = ASCII_INTEGER
    START_BYTE               = 1
    BYTES                    = 5
    DESCRIPTION              = " Frame counter value (0-65535)"
  END_OBJECT                 = COLUMN
  OBJECT                     = COLUMN
    NAME                     = "SC_RCVD_TIME"
    COLUMN_NUMBER            = 2
    DATA_TYPE                = ASCII_REAL
    START_BYTE               = 6
    BYTES                    = 14
    DESCRIPTION              = " Spacecraft received time"
  END_OBJECT                 = COLUMN
  OBJECT                     = COLUMN
    NAME                     = "FIRST_TIMEHACK"
    COLUMN_NUMBER            = 3
    DATA_TYPE                = ASCII_INTEGER
```

```
  START_BYTE            = 20
  BYTES                 = 10
  DESCRIPTION           = " First timehack"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "LAST_TIMEHACK"
  COLUMN_NUMBER         = 4
  DATA_TYPE             = ASCII_INTEGER
  START_BYTE            = 30
  BYTES                 = 10
  DESCRIPTION           = " Last timehack"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SC_TIME_FIRST_HACK"
  COLUMN_NUMBER         = 5
  DATA_TYPE             = ASCII_REAL
  START_BYTE            = 40
  BYTES                 = 14
  DESCRIPTION           = " Spacecraft time of the first timehack"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SC_TIME_LAST_HACK"
  COLUMN_NUMBER         = 6
  DATA_TYPE             = ASCII_REAL
  START_BYTE            = 54
  BYTES                 = 14
  DESCRIPTION           = " Spacecraft time of the last timehack"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "FRAME_QUALITY"
  COLUMN_NUMBER         = 7
  DATA_TYPE             = ASCII_INTEGER
  START_BYTE            = 68
  BYTES                 = 3
  DESCRIPTION           = " Frame quality"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "FRAME_TAG"
  COLUMN_NUMBER         = 8
  DATA_TYPE             = ASCII_INTEGER
  START_BYTE            = 71
  BYTES                 = 5
  DESCRIPTION           = " Frame tag"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "FINAL_FRAME"
  COLUMN_NUMBER         = 9
  DATA_TYPE             = ASCII_INTEGER
  START_BYTE            = 76
```

```
  BYTES                = 1
  DESCRIPTION          = " Final frame flag"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "QUALITY_FLAG"
  COLUMN_NUMBER        = 10
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 77
  BYTES                = 3
  DESCRIPTION          = " Quality flag"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "MEMORY_SIDE"
  COLUMN_NUMBER        = 11
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 80
  BYTES                = 1
  DESCRIPTION          = " Memory side (0=A,1=B)"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "HACK_RATE"
  COLUMN_NUMBER        = 12
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 81
  BYTES                = 2
  DESCRIPTION          = " Hack Rate (0=1ms, 1=2ms, 3=4ms, ... 9=512ms)"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "NUM_TIMEHACKS"
  COLUMN_NUMBER        = 13
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 83
  BYTES                = 5
  DESCRIPTION          = " Number of timehacks"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "FRMSUM"
  COLUMN_NUMBER        = 14
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 88
  BYTES                = 8
  DESCRIPTION          = " Computed frmsum"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CHKSUM"
  COLUMN_NUMBER        = 15
  DATA_TYPE            = ASCII_INTEGER
  START_BYTE           = 96
  BYTES                = 8
```

```
    DESCRIPTION             = " Computed chksum"
  END_OBJECT                = COLUMN
  OBJECT                    = COLUMN
    NAME                    = "TYPE"
    COLUMN_NUMBER           = 16
    DATA_TYPE               = ASCII_INTEGER
    START_BYTE              = 104
    BYTES                   = 2
    DESCRIPTION             = " Computed frame type"
  END_OBJECT                = COLUMN
  OBJECT                    = COLUMN
    NAME                    = "CLOCK_PERIOD"
    COLUMN_NUMBER           = 17
    DATA_TYPE               = ASCII_INTEGER
    START_BYTE              = 106
    BYTES                   = 10
    DESCRIPTION             = " Clock period assigned to frame"
  END_OBJECT                = COLUMN
  OBJECT                    = COLUMN
    NAME                    = "NUM_ACQS"
    COLUMN_NUMBER           = 18
    DATA_TYPE               = ASCII_INTEGER
    START_BYTE              = 116
    BYTES                   = 5
    DESCRIPTION             = " Number of actual acquisitions"
  END_OBJECT                = COLUMN
  OBJECT                    = COLUMN
    NAME                    = "EXPECTED"
    COLUMN_NUMBER           = 19
    DATA_TYPE               = ASCII_INTEGER
    START_BYTE              = 121
    BYTES                   = 1
    DESCRIPTION             = "
      Was frame counter 1 + previous frame counter?"
  END_OBJECT                = COLUMN
  OBJECT                    = COLUMN
    NAME                    = "FILE"
    COLUMN_NUMBER           = 20
    DATA_TYPE               = CHARACTER
    START_BYTE              = 122
    BYTES                   = 64
    DESCRIPTION             = " Source filename"
  END_OBJECT                = COLUMN
END_OBJECT                  = ACQUISITION_LIST_TABLE

OBJECT                      = CALIBRATED_PHOTON_LIST_HEADER
  BYTES                     = 5760 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE               = FITS
  INTERCHANGE_FORMAT        = BINARY
```

```
  RECORDS                = 2
  DESCRIPTION            = "
    This is the FITS header for FITS extension number = 1, FITS extension name
    = CALIBRATED_PHOTON_LIST"
END_OBJECT               = CALIBRATED_PHOTON_LIST_HEADER

OBJECT                   = CALIBRATED_PHOTON_LIST_TABLE
  INTERCHANGE_FORMAT     = BINARY
  ROWS                   = 20242632
  COLUMNS                = 19
  ROW_BYTES              = 86
  DESCRIPTION            = "
    Binary data table with data for each photon detected during the
    observation."
  OBJECT                 = COLUMN
    NAME                 = "HACK_TIME"
    COLUMN_NUMBER        = 1
    DATA_TYPE            = LSB_INTEGER
    START_BYTE           = 1
    BYTES                = 4
    DESCRIPTION          = "Photon s/c timehack"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "DETECTOR_X"
    COLUMN_NUMBER        = 2
    DATA_TYPE            = LSB_INTEGER
    START_BYTE           = 5
    BYTES                = 4
    DESCRIPTION          = "Photon detector x coordinate"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "DETECTOR_Y"
    COLUMN_NUMBER        = 3
    DATA_TYPE            = LSB_INTEGER
    START_BYTE           = 9
    BYTES                = 4
    DESCRIPTION          = "Photon detector y coordinate"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "ANGLE_FROM_SPIN_PLANE"
    COLUMN_NUMBER        = 4
    DATA_TYPE            = IEEE_REAL
    START_BYTE           = 13
    BYTES                = 4
    DESCRIPTION          = "Photon Angle from Spin Plane"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "WAVELENGTH"
    COLUMN_NUMBER        = 5
```

```
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 17
  BYTES                  = 4
  DESCRIPTION            = "Photon Spectral"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EPHEMERIS_TIME"
  COLUMN_NUMBER          = 6
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 21
  BYTES                  = 8
  DESCRIPTION            = "Photon timehack SC time"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SPIN_PHASE"
  COLUMN_NUMBER          = 7
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 29
  BYTES                  = 4
  DESCRIPTION            = "Spin Phase"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "PULSE_HEIGHT"
  COLUMN_NUMBER          = 8
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 33
  BYTES                  = 4
  DESCRIPTION            = "Pulse Height"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "RA"
  COLUMN_NUMBER          = 9
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 37
  BYTES                  = 4
  DESCRIPTION            = "Lambda Photon Angle (RA)"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "DEC"
  COLUMN_NUMBER          = 10
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 41
  BYTES                  = 4
  DESCRIPTION            = "Beta Photon Angle (Dec)"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "WEIGHTED_COUNT"
  COLUMN_NUMBER          = 11
  DATA_TYPE              = IEEE_REAL
```

```
  START_BYTE            = 45
  BYTES                 = 4
  DESCRIPTION           = "Weighted Count"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "LATITUDE"
  COLUMN_NUMBER         = 12
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 49
  BYTES                 = 4
  DESCRIPTION           = "Latitude on Target"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "LONGITUDE"
  COLUMN_NUMBER         = 13
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 53
  BYTES                 = 4
  DESCRIPTION           = "Longitude on Target"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ALTITUDE"
  COLUMN_NUMBER         = 14
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 57
  BYTES                 = 4
  DESCRIPTION           = "Altitude from Target"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "INCIDENCE_ANGLE"
  COLUMN_NUMBER         = 15
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 61
  BYTES                 = 4
  DESCRIPTION           = "Incidence Angle to Target"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "EMISSION_ANGLE"
  COLUMN_NUMBER         = 16
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 65
  BYTES                 = 4
  DESCRIPTION           = "Emission Angle to Target"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "DIGITAL_DEADTIME_FACTOR"
  COLUMN_NUMBER         = 17
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 69
```

```
    BYTES                = 4
    DESCRIPTION          = "Deadtime Factor"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "ANALOG_DEADTIME_FACTOR"
    COLUMN_NUMBER        = 18
    DATA_TYPE            = IEEE_REAL
    START_BYTE           = 73
    BYTES                = 4
    DESCRIPTION          = "Spin Phase"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "LOCAL_TIME"
    COLUMN_NUMBER        = 19
    DATA_TYPE            = CHARACTER
    START_BYTE           = 77
    BYTES                = 10
    DESCRIPTION          = "Local time on Target"
  END_OBJECT             = COLUMN
END_OBJECT               = CALIBRATED_PHOTON_LIST_TABLE

OBJECT                   = ANCILLARY_DATA_HEADER
  BYTES                  = 23040 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE            = FITS
  INTERCHANGE_FORMAT     = BINARY
  RECORDS                = 8
  DESCRIPTION            = "
    This is the FITS header for FITS extension number = 2, FITS extension name
    = ANCILLARY_DATA"
END_OBJECT               = ANCILLARY_DATA_HEADER

OBJECT                   = ANCILLARY_DATA_TABLE
  INTERCHANGE_FORMAT     = BINARY
  ROWS                   = 4295
  COLUMNS                = 129
  ROW_BYTES              = 520
  OBJECT                 = COLUMN
    NAME                 = "EPHEMERIS_TIME_SLOW"
    COLUMN_NUMBER        = 1
    DATA_TYPE            = IEEE_REAL
    START_BYTE           = 1
    BYTES                = 8
    DESCRIPTION          = "Ephemeris Time"
  END_OBJECT             = COLUMN
  OBJECT                 = COLUMN
    NAME                 = "SCAN_MIRROR_ANGLE"
    COLUMN_NUMBER        = 2
    DATA_TYPE            = LSB_INTEGER
    START_BYTE           = 9
```

```
  BYTES                = 4
  DESCRIPTION          = "Scan Mirror Angle"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SOLAR_ZENITH_ANG"
  COLUMN_NUMBER        = 3
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 13
  BYTES                = 4
  DESCRIPTION          = "Solar Zenith Angle"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SC_SHADOW_FLAG"
  COLUMN_NUMBER        = 4
  DATA_TYPE            = LSB_INTEGER
  START_BYTE           = 17
  BYTES                = 4
  DESCRIPTION          = "Spacecraft Shadow Flag"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SUBSOLAR_LAT"
  COLUMN_NUMBER        = 5
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 21
  BYTES                = 4
  DESCRIPTION          = "Subsolar Latitude"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SUBSOLAR_LON"
  COLUMN_NUMBER        = 6
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 25
  BYTES                = 4
  DESCRIPTION          = "Subsolar Longitude"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SUBSC_LAT"
  COLUMN_NUMBER        = 7
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 29
  BYTES                = 4
  DESCRIPTION          = "Subspacecraft Latitude"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SUBSC_LON"
  COLUMN_NUMBER        = 8
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 33
  BYTES                = 4
```

```
  DESCRIPTION            = "Subspacecraft Longitude"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "LOOK_ZENITH_ANG"
  COLUMN_NUMBER          = 9
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 37
  BYTES                  = 4
  DESCRIPTION            = "Spacecraft Zenith Angle"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "SC_SPIN_AXIS_RA"
  COLUMN_NUMBER          = 10
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 41
  BYTES                  = 4
  DESCRIPTION            = "Spacecraft Spin Axis RA"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "SC_SPIN_AXIS_DEC"
  COLUMN_NUMBER          = 11
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 45
  BYTES                  = 4
  DESCRIPTION            = "Spacecraft Spin Axis DEC"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "PHASE_ANG"
  COLUMN_NUMBER          = 12
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 49
  BYTES                  = 4
  DESCRIPTION            = "Phase Angle"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "AZIMUTH_ANG"
  COLUMN_NUMBER          = 13
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 53
  BYTES                  = 4
  DESCRIPTION            = "Azimuth Angle"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "JUPITER_RA"
  COLUMN_NUMBER          = 14
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 57
  BYTES                  = 4
  DESCRIPTION            = "JUPITER RA"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_DEC"
  COLUMN_NUMBER         = 15
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 61
  BYTES                 = 4
  DESCRIPTION           = "JUPITER DEC"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ECLIPTIC_X"
  COLUMN_NUMBER         = 16
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 65
  BYTES                 = 4
  DESCRIPTION           = "Ecliptic X Coordinate"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ECLIPTIC_Y"
  COLUMN_NUMBER         = 17
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 69
  BYTES                 = 4
  DESCRIPTION           = "Ecliptic Y Coordinate"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ECLIPTIC_Z"
  COLUMN_NUMBER         = 18
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 73
  BYTES                 = 4
  DESCRIPTION           = "Ecliptic Z Coordinate"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "STIM_DRIFT1_X"
  COLUMN_NUMBER         = 19
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 77
  BYTES                 = 4
  DESCRIPTION           = "Stim Drift 1 X Coordinate"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "STIM_DRIFT1_Y"
  COLUMN_NUMBER         = 20
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 81
  BYTES                 = 4
  DESCRIPTION           = "Stim Drift 1 Y Coordinate"
END_OBJECT              = COLUMN
```

```
OBJECT                = COLUMN
  NAME                = "STIM_DRIFT2_X"
  COLUMN_NUMBER       = 21
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 85
  BYTES               = 4
  DESCRIPTION         = "Stim Drift 2 X Coordinate"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "STIM_DRIFT2_Y"
  COLUMN_NUMBER       = 22
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 89
  BYTES               = 4
  DESCRIPTION         = "Stim Drift 2 Y Coordinate"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "DARK_FACTOR"
  COLUMN_NUMBER       = 23
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 93
  BYTES               = 4
  DESCRIPTION         = "Dark Factor"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "SC_RANGE"
  COLUMN_NUMBER       = 24
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 97
  BYTES               = 4
  DESCRIPTION         = "Spacecraft Range"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "SC_ALTITUDE"
  COLUMN_NUMBER       = 25
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 101
  BYTES               = 4
  DESCRIPTION         = "Spacecraft Altitude"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "UVS_BORESIGHT_RA"
  COLUMN_NUMBER       = 26
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 105
  BYTES               = 4
  DESCRIPTION         = "UVS Boresight RA"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
  NAME                = "UVS_BORESIGHT_DEC"
  COLUMN_NUMBER           = 27
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 109
  BYTES                = 4
  DESCRIPTION             = "UVS Boresight DEC"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_LATITUDE"
  COLUMN_NUMBER           = 28
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 113
  BYTES                = 4
  DESCRIPTION             = "SUN LATITUDE"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_LONGITUDE"
  COLUMN_NUMBER           = 29
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 117
  BYTES                = 4
  DESCRIPTION             = "SUN LONGITUDE"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_RANGE"
  COLUMN_NUMBER           = 30
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 121
  BYTES                = 4
  DESCRIPTION             = "SUN RANGE"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_ECLIPTIC_X"
  COLUMN_NUMBER           = 31
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 125
  BYTES                = 4
  DESCRIPTION             = "SUN ECLIPTIC_X"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_ECLIPTIC_Y"
  COLUMN_NUMBER           = 32
  DATA_TYPE             = IEEE_REAL
  START_BYTE             = 129
  BYTES                = 4
  DESCRIPTION             = "SUN ECLIPTIC_Y"
END_OBJECT              = COLUMN
OBJECT                 = COLUMN
  NAME                = "SUN_ECLIPTIC_Z"
```

```
  COLUMN_NUMBER          = 33
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 133
  BYTES                  = 4
  DESCRIPTION            = "SUN ECLIPTIC_Z"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_LATITUDE"
  COLUMN_NUMBER          = 34
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 137
  BYTES                  = 4
  DESCRIPTION            = "EARTH LATITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_LONGITUDE"
  COLUMN_NUMBER          = 35
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 141
  BYTES                  = 4
  DESCRIPTION            = "EARTH LONGITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_RANGE"
  COLUMN_NUMBER          = 36
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 145
  BYTES                  = 4
  DESCRIPTION            = "EARTH RANGE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_ECLIPTIC_X"
  COLUMN_NUMBER          = 37
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 149
  BYTES                  = 4
  DESCRIPTION            = "EARTH ECLIPTIC_X"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_ECLIPTIC_Y"
  COLUMN_NUMBER          = 38
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 153
  BYTES                  = 4
  DESCRIPTION            = "EARTH ECLIPTIC_Y"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "EARTH_ECLIPTIC_Z"
  COLUMN_NUMBER          = 39
```

```
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 157
  BYTES                  = 4
  DESCRIPTION            = "EARTH ECLIPTIC_Z"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_LATITUDE"
  COLUMN_NUMBER          = 40
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 161
  BYTES                  = 4
  DESCRIPTION            = "MOON LATITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_LONGITUDE"
  COLUMN_NUMBER          = 41
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 165
  BYTES                  = 4
  DESCRIPTION            = "MOON LONGITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_RANGE"
  COLUMN_NUMBER          = 42
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 169
  BYTES                  = 4
  DESCRIPTION            = "MOON RANGE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_ECLIPTIC_X"
  COLUMN_NUMBER          = 43
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 173
  BYTES                  = 4
  DESCRIPTION            = "MOON ECLIPTIC_X"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_ECLIPTIC_Y"
  COLUMN_NUMBER          = 44
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 177
  BYTES                  = 4
  DESCRIPTION            = "MOON ECLIPTIC_Y"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MOON_ECLIPTIC_Z"
  COLUMN_NUMBER          = 45
  DATA_TYPE              = IEEE_REAL
```

```
  START_BYTE            = 181
  BYTES                 = 4
  DESCRIPTION           = "MOON ECLIPTIC_Z"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_LATITUDE"
  COLUMN_NUMBER         = 46
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 185
  BYTES                 = 4
  DESCRIPTION           = "JUPITER LATITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_LONGITUDE"
  COLUMN_NUMBER         = 47
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 189
  BYTES                 = 4
  DESCRIPTION           = "JUPITER LONGITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_RANGE"
  COLUMN_NUMBER         = 48
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 193
  BYTES                 = 4
  DESCRIPTION           = "JUPITER RANGE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_ECLIPTIC_X"
  COLUMN_NUMBER         = 49
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 197
  BYTES                 = 4
  DESCRIPTION           = "JUPITER ECLIPTIC_X"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_ECLIPTIC_Y"
  COLUMN_NUMBER         = 50
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 201
  BYTES                 = 4
  DESCRIPTION           = "JUPITER ECLIPTIC_Y"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "JUPITER_ECLIPTIC_Z"
  COLUMN_NUMBER         = 51
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 205
```

```
  BYTES                = 4
  DESCRIPTION          = "JUPITER ECLIPTIC_Z"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_LATITUDE"
  COLUMN_NUMBER        = 52
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 209
  BYTES                = 4
  DESCRIPTION          = "IO LATITUDE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_LONGITUDE"
  COLUMN_NUMBER        = 53
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 213
  BYTES                = 4
  DESCRIPTION          = "IO LONGITUDE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_RANGE"
  COLUMN_NUMBER        = 54
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 217
  BYTES                = 4
  DESCRIPTION          = "IO RANGE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_ECLIPTIC_X"
  COLUMN_NUMBER        = 55
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 221
  BYTES                = 4
  DESCRIPTION          = "IO ECLIPTIC_X"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_ECLIPTIC_Y"
  COLUMN_NUMBER        = 56
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 225
  BYTES                = 4
  DESCRIPTION          = "IO ECLIPTIC_Y"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "IO_ECLIPTIC_Z"
  COLUMN_NUMBER        = 57
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 229
  BYTES                = 4
```

```
  DESCRIPTION            = "IO ECLIPTIC_Z"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_FOOTPRINT_NORTH_LATITUDE"
  COLUMN_NUMBER          = 58
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 233
  BYTES                  = 4
  DESCRIPTION            = "IO FOOTPRINT_NORTH_LATITUDE"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_FOOTPRINT_NORTH_LONGITUDE"
  COLUMN_NUMBER          = 59
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 237
  BYTES                  = 4
  DESCRIPTION            = "IO FOOTPRINT_NORTH_LONGITUDE"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_FOOTPRINT_SOUTH_LATITUDE"
  COLUMN_NUMBER          = 60
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 241
  BYTES                  = 4
  DESCRIPTION            = "IO FOOTPRINT_SOUTH_LATITUDE"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_FOOTPRINT_SOUTH_LONGITUDE"
  COLUMN_NUMBER          = 61
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 245
  BYTES                  = 4
  DESCRIPTION            = "IO FOOTPRINT_SOUTH_LONGITUDE"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_JMAG_X"
  COLUMN_NUMBER          = 62
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 249
  BYTES                  = 4
  DESCRIPTION            = "IO JMAG_X"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "IO_JMAG_Y"
  COLUMN_NUMBER          = 63
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 253
  BYTES                  = 4
  DESCRIPTION            = "IO JMAG_Y"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "IO_JMAG_Z"
  COLUMN_NUMBER         = 64
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 257
  BYTES                 = 4
  DESCRIPTION           = "IO JMAG_Z"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "IO_LSHELL_COORD"
  COLUMN_NUMBER         = 65
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 261
  BYTES                 = 4
  DESCRIPTION           = "IO LSHELL_COORD"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "IO_MAGNETIC_LOCAL_TIME"
  COLUMN_NUMBER         = 66
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 265
  BYTES                 = 4
  DESCRIPTION           = "IO MAGNETIC_LOCAL_TIME"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "EUROPA_LATITUDE"
  COLUMN_NUMBER         = 67
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 269
  BYTES                 = 4
  DESCRIPTION           = "EUROPA LATITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "EUROPA_LONGITUDE"
  COLUMN_NUMBER         = 68
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 273
  BYTES                 = 4
  DESCRIPTION           = "EUROPA LONGITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "EUROPA_RANGE"
  COLUMN_NUMBER         = 69
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 277
  BYTES                 = 4
  DESCRIPTION           = "EUROPA RANGE"
END_OBJECT              = COLUMN
```

```
OBJECT                = COLUMN
  NAME                = "EUROPA_ECLIPTIC_X"
  COLUMN_NUMBER       = 70
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 281
  BYTES               = 4
  DESCRIPTION         = "EUROPA ECLIPTIC_X"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_ECLIPTIC_Y"
  COLUMN_NUMBER       = 71
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 285
  BYTES               = 4
  DESCRIPTION         = "EUROPA ECLIPTIC_Y"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_ECLIPTIC_Z"
  COLUMN_NUMBER       = 72
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 289
  BYTES               = 4
  DESCRIPTION         = "EUROPA ECLIPTIC_Z"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_FOOTPRINT_NORTH_LATITUDE"
  COLUMN_NUMBER       = 73
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 293
  BYTES               = 4
  DESCRIPTION         = "EUROPA FOOTPRINT_NORTH_LATITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_FOOTPRINT_NORTH_LONGITUDE"
  COLUMN_NUMBER       = 74
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 297
  BYTES               = 4
  DESCRIPTION         = "EUROPA FOOTPRINT_NORTH_LONGITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_FOOTPRINT_SOUTH_LATITUDE"
  COLUMN_NUMBER       = 75
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 301
  BYTES               = 4
  DESCRIPTION         = "EUROPA FOOTPRINT_SOUTH_LATITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
  NAME                = "EUROPA_FOOTPRINT_SOUTH_LONGITUDE"
  COLUMN_NUMBER       = 76
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 305
  BYTES               = 4
  DESCRIPTION         = "EUROPA FOOTPRINT_SOUTH_LONGITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_JMAG_X"
  COLUMN_NUMBER       = 77
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 309
  BYTES               = 4
  DESCRIPTION         = "EUROPA JMAG_X"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_JMAG_Y"
  COLUMN_NUMBER       = 78
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 313
  BYTES               = 4
  DESCRIPTION         = "EUROPA JMAG_Y"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_JMAG_Z"
  COLUMN_NUMBER       = 79
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 317
  BYTES               = 4
  DESCRIPTION         = "EUROPA JMAG_Z"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_LSHELL_COORD"
  COLUMN_NUMBER       = 80
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 321
  BYTES               = 4
  DESCRIPTION         = "EUROPA LSHELL_COORD"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EUROPA_MAGNETIC_LOCAL_TIME"
  COLUMN_NUMBER       = 81
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 325
  BYTES               = 4
  DESCRIPTION         = "EUROPA MAGNETIC_LOCAL_TIME"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "GANYMEDE_LATITUDE"
```

```
  COLUMN_NUMBER          = 82
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 329
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE LATITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_LONGITUDE"
  COLUMN_NUMBER          = 83
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 333
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE LONGITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_RANGE"
  COLUMN_NUMBER          = 84
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 337
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE RANGE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_ECLIPTIC_X"
  COLUMN_NUMBER          = 85
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 341
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE ECLIPTIC_X"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_ECLIPTIC_Y"
  COLUMN_NUMBER          = 86
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 345
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE ECLIPTIC_Y"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_ECLIPTIC_Z"
  COLUMN_NUMBER          = 87
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 349
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE ECLIPTIC_Z"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_FOOTPRINT_NORTH_LATITUDE"
  COLUMN_NUMBER          = 88
```

```
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 353
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE FOOTPRINT_NORTH_LA     TITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_FOOTPRINT_NORTH_LONGITUDE"
  COLUMN_NUMBER          = 89
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 357
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE FOOTPRINT_NORTH_L     ONGITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_FOOTPRINT_SOUTH_LATITUDE"
  COLUMN_NUMBER          = 90
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 361
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE FOOTPRINT_SOUTH_LA     TITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_FOOTPRINT_SOUTH_LONGITUDE"
  COLUMN_NUMBER          = 91
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 365
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE FOOTPRINT_SOUTH_L     ONGITUDE"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_JMAG_X"
  COLUMN_NUMBER          = 92
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 369
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE JMAG_X"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_JMAG_Y"
  COLUMN_NUMBER          = 93
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 373
  BYTES                  = 4
  DESCRIPTION            = "GANYMEDE JMAG_Y"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "GANYMEDE_JMAG_Z"
  COLUMN_NUMBER          = 94
  DATA_TYPE              = IEEE_REAL
```

```
  START_BYTE            = 377
  BYTES                 = 4
  DESCRIPTION           = "GANYMEDE JMAG_Z"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "GANYMEDE_LSHELL_COORD"
  COLUMN_NUMBER         = 95
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 381
  BYTES                 = 4
  DESCRIPTION           = "GANYMEDE LSHELL_COORD"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "GANYMEDE_MAGNETIC_LOCAL_TIME"
  COLUMN_NUMBER         = 96
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 385
  BYTES                 = 4
  DESCRIPTION           = "GANYMEDE MAGNETIC_LOCAL_TIME"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CALLISTO_LATITUDE"
  COLUMN_NUMBER         = 97
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 389
  BYTES                 = 4
  DESCRIPTION           = "CALLISTO LATITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CALLISTO_LONGITUDE"
  COLUMN_NUMBER         = 98
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 393
  BYTES                 = 4
  DESCRIPTION           = "CALLISTO LONGITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CALLISTO_RANGE"
  COLUMN_NUMBER         = 99
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 397
  BYTES                 = 4
  DESCRIPTION           = "CALLISTO RANGE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CALLISTO_ECLIPTIC_X"
  COLUMN_NUMBER         = 100
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 401
```

```
  BYTES                = 4
  DESCRIPTION          = "CALLISTO ECLIPTIC_X"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_ECLIPTIC_Y"
  COLUMN_NUMBER        = 101
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 405
  BYTES                = 4
  DESCRIPTION          = "CALLISTO ECLIPTIC_Y"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_ECLIPTIC_Z"
  COLUMN_NUMBER        = 102
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 409
  BYTES                = 4
  DESCRIPTION          = "CALLISTO ECLIPTIC_Z"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_FOOTPRINT_NORTH_LATITUDE"
  COLUMN_NUMBER        = 103
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 413
  BYTES                = 4
  DESCRIPTION          = "CALLISTO FOOTPRINT_NORTH_LA     TITUDE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_FOOTPRINT_NORTH_LONGITUDE"
  COLUMN_NUMBER        = 104
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 417
  BYTES                = 4
  DESCRIPTION          = "CALLISTO FOOTPRINT_NORTH_L     ONGITUDE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_FOOTPRINT_SOUTH_LATITUDE"
  COLUMN_NUMBER        = 105
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 421
  BYTES                = 4
  DESCRIPTION          = "CALLISTO FOOTPRINT_SOUTH_LA     TITUDE"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "CALLISTO_FOOTPRINT_SOUTH_LONGITUDE"
  COLUMN_NUMBER        = 106
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 425
  BYTES                = 4
```

```
  DESCRIPTION            = "CALLISTO FOOTPRINT_SOUTH_L     ONGITUDE"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "CALLISTO_JMAG_X"
  COLUMN_NUMBER          = 107
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 429
  BYTES                  = 4
  DESCRIPTION            = "CALLISTO JMAG_X"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "CALLISTO_JMAG_Y"
  COLUMN_NUMBER          = 108
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 433
  BYTES                  = 4
  DESCRIPTION            = "CALLISTO JMAG_Y"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "CALLISTO_JMAG_Z"
  COLUMN_NUMBER          = 109
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 437
  BYTES                  = 4
  DESCRIPTION            = "CALLISTO JMAG_Z"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "CALLISTO_LSHELL_COORD"
  COLUMN_NUMBER          = 110
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 441
  BYTES                  = 4
  DESCRIPTION            = "CALLISTO LSHELL_COORD"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "CALLISTO_MAGNETIC_LOCAL_TIME"
  COLUMN_NUMBER          = 111
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 445
  BYTES                  = 4
  DESCRIPTION            = "CALLISTO MAGNETIC_LOCAL_TIME"
 END_OBJECT              = COLUMN
 OBJECT                  = COLUMN
  NAME                   = "AMALTHEA_LATITUDE"
  COLUMN_NUMBER          = 112
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 449
  BYTES                  = 4
  DESCRIPTION            = "AMALTHEA LATITUDE"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_LONGITUDE"
  COLUMN_NUMBER         = 113
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 453
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA LONGITUDE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_RANGE"
  COLUMN_NUMBER         = 114
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 457
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA RANGE"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_ECLIPTIC_X"
  COLUMN_NUMBER         = 115
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 461
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA ECLIPTIC_X"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_ECLIPTIC_Y"
  COLUMN_NUMBER         = 116
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 465
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA ECLIPTIC_Y"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_ECLIPTIC_Z"
  COLUMN_NUMBER         = 117
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 469
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA ECLIPTIC_Z"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "AMALTHEA_FOOTPRINT_NORTH_LATITUDE"
  COLUMN_NUMBER         = 118
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 473
  BYTES                 = 4
  DESCRIPTION           = "AMALTHEA FOOTPRINT_NORTH_LA     TITUDE"
END_OBJECT              = COLUMN
```

```
OBJECT                = COLUMN
  NAME                = "AMALTHEA_FOOTPRINT_NORTH_LONGITUDE"
  COLUMN_NUMBER       = 119
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 477
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA FOOTPRINT_NORTH_L     ONGITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AMALTHEA_FOOTPRINT_SOUTH_LATITUDE"
  COLUMN_NUMBER       = 120
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 481
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA FOOTPRINT_SOUTH_LA     TITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AMALTHEA_FOOTPRINT_SOUTH_LONGITUDE"
  COLUMN_NUMBER       = 121
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 485
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA FOOTPRINT_SOUTH_L     ONGITUDE"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AMALTHEA_JMAG_X"
  COLUMN_NUMBER       = 122
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 489
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA JMAG_X"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AMALTHEA_JMAG_Y"
  COLUMN_NUMBER       = 123
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 493
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA JMAG_Y"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AMALTHEA_JMAG_Z"
  COLUMN_NUMBER       = 124
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 497
  BYTES               = 4
  DESCRIPTION         = "AMALTHEA JMAG_Z"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
    NAME                = "AMALTHEA_LSHELL_COORD"
    COLUMN_NUMBER       = 125
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 501
    BYTES               = 4
    DESCRIPTION         = "AMALTHEA LSHELL_COORD"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "AMALTHEA_MAGNETIC_LOCAL_TIME"
    COLUMN_NUMBER       = 126
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 505
    BYTES               = 4
    DESCRIPTION         = "AMALTHEA MAGNETIC_LOCAL_TIME"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "JUNO_JMAG_X"
    COLUMN_NUMBER       = 127
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 509
    BYTES               = 4
    DESCRIPTION         = "JUNO JMAG X"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "JUNO_JMAG_Y"
    COLUMN_NUMBER       = 128
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 513
    BYTES               = 4
    DESCRIPTION         = "JUNO JMAG Y"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "JUNO_JMAG_Z"
    COLUMN_NUMBER       = 129
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 517
    BYTES               = 4
    DESCRIPTION         = "JUNO JMAG Z"
  END_OBJECT            = COLUMN
END_OBJECT              = ANCILLARY_DATA_TABLE

OBJECT                  = CALIBRATED_ANALOG_COUNTRATE_HEADER
  BYTES                 = 2880 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE           = FITS
  INTERCHANGE_FORMAT    = ASCII
  RECORDS               = 1
  DESCRIPTION           = "
    This is the FITS header for FITS extension number = 3, FITS extension name
    = CALIBRATED_ANALOG_COUNT_RATES"
```

```
END_OBJECT              = CALIBRATED_ANALOG_COUNTRATE_HEADER

OBJECT                  = CALIBRATED_ANALOG_COUNTRATE_TABLE
  INTERCHANGE_FORMAT      = BINARY
  ROWS                  = 42955
  COLUMNS                 = 2
  ROW_BYTES               = 12
  OBJECT                = COLUMN
    NAME                = "SCUT_TIME"
    COLUMN_NUMBER         = 1
    DATA_TYPE             = IEEE_REAL
    START_BYTE            = 1
    BYTES               = 8
    DESCRIPTION           = "Spacecraft UTC (seconds)"
  END_OBJECT              = COLUMN
  OBJECT                = COLUMN
    NAME                = "COUNT_RATE"
    COLUMN_NUMBER         = 2
    DATA_TYPE             = LSB_INTEGER
    START_BYTE            = 9
    BYTES               = 4
    DESCRIPTION           = "Calibrated count rate for the interval (Hz)"
  END_OBJECT              = COLUMN
END_OBJECT                = CALIBRATED_ANALOG_COUNTRATE_TABLE

OBJECT                  = CALIBRATED_DIGITAL_COUNTRATE_HEADER
  BYTES                 = 2880 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE             = FITS
  INTERCHANGE_FORMAT      = ASCII
  RECORDS               = 1
  DESCRIPTION             = "
    This is the FITS header for FITS extension number = 4, FITS extension name
    = CALIBRATED_DIGITAL_COUNT_RATES"
END_OBJECT                = CALIBRATED_DIGITAL_COUNTRATE_HEADER

OBJECT                  = CALIBRATED_DIGITAL_COUNTRATE_TABLE
  INTERCHANGE_FORMAT      = BINARY
  ROWS                  = 4268807
  COLUMNS                 = 3
  ROW_BYTES               = 16
  OBJECT                = COLUMN
    NAME                = "HACK_TIME"
    COLUMN_NUMBER         = 1
    DATA_TYPE             = LSB_INTEGER
    START_BYTE            = 1
    BYTES               = 4
    DESCRIPTION           = "Hack time at the start of the interval"
  END_OBJECT              = COLUMN
  OBJECT                = COLUMN
```

```
    NAME                = "SCUT_TIME"
    COLUMN_NUMBER       = 2
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 5
    BYTES               = 8
    DESCRIPTION         = "Spacecraft UTC (seconds)"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "COUNT_RATE"
    COLUMN_NUMBER       = 3
    DATA_TYPE           = LSB_INTEGER
    START_BYTE          = 13
    BYTES               = 4
    DESCRIPTION         = "Calibrated count rate for the interval (Hz)"
  END_OBJECT            = COLUMN
END_OBJECT              = CALIBRATED_DIGITAL_COUNTRATE_TABLE

OBJECT                  = HOUSEKEEPING_HEADER
  BYTES                 = 31680 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE           = FITS
  INTERCHANGE_FORMAT    = ASCII
  RECORDS               = 11
  DESCRIPTION           = "
    This is the FITS header for FITS extension number = 8, FITS extension name
    = HOUSEKEEPING"
END_OBJECT              = HOUSEKEEPING_HEADER

OBJECT                  = HOUSEKEEPING_TABLE
  INTERCHANGE_FORMAT    = BINARY
  ROWS                  = 2148
  COLUMNS               = 144
  ROW_BYTES             = 766
  OBJECT                = COLUMN
    NAME                = "SCLK_TIME"
    COLUMN_NUMBER       = 1
    DATA_TYPE           = IEEE_REAL
    START_BYTE          = 1
    BYTES               = 8
    DESCRIPTION         = " Spacecraft clock (seconds since epoch)"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
    NAME                = "HACK_TIME"
    COLUMN_NUMBER       = 2
    DATA_TYPE           = LSB_INTEGER
    START_BYTE          = 9
    BYTES               = 4
    DESCRIPTION         = " Instrument hack time"
  END_OBJECT            = COLUMN
  OBJECT                = COLUMN
```

```
  NAME                = "PACK_CNT"
  COLUMN_NUMBER       = 3
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 13
  BYTES               = 2
  DESCRIPTION         = " 16-bit packet counter"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "PACKET_DATA"
  COLUMN_NUMBER       = 4
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 15
  BYTES               = 340
  DESCRIPTION         = " Raw HK packet (340 bytes)"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "INST_STATE"
  COLUMN_NUMBER       = 5
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 355
  BYTES               = 1
  DESCRIPTION         = "
    Instrument State (0=off, 1=checkout, 2=safe, 3acq, 4=decon)"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "SAFETY_ACTIVE"
  COLUMN_NUMBER       = 6
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 356
  BYTES               = 1
  DESCRIPTION         = " 1=safety active"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "LAST_SAFETY"
  COLUMN_NUMBER       = 7
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 357
  BYTES               = 1
  DESCRIPTION         = " Last safety (0=none)"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "LVPS_STATUS"
  COLUMN_NUMBER       = 8
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 358
  BYTES               = 1
  DESCRIPTION         = " Power status for each LVPS, 1=active"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
  NAME                = "HVPS_STATUS"
  COLUMN_NUMBER       = 9
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 359
  BYTES               = 1
  DESCRIPTION         = " Power status for each HVPS, 1=active"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "DETECTOR_PWR"
  COLUMN_NUMBER       = 10
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 360
  BYTES               = 1
  DESCRIPTION         = " Power status of detector, 1=on"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "TURN_OFF_REQ"
  COLUMN_NUMBER       = 11
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 361
  BYTES               = 1
  DESCRIPTION         = " 1=request instrument shutdown by s/c"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "WPA_DRIVEN"
  COLUMN_NUMBER       = 12
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 362
  BYTES               = 1
  DESCRIPTION         = " 1=WPA activated"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "WPA_SWITCH"
  COLUMN_NUMBER       = 13
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 363
  BYTES               = 1
  DESCRIPTION         = " 1=WPA stroke switch activated"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "HVPS_SAFE"
  COLUMN_NUMBER       = 14
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 364
  BYTES               = 1
  DESCRIPTION         = "
    Safing status for each HVPS, 1=safing plug insalled"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
  NAME                = "RST_ACT_SAFE"
  COLUMN_NUMBER       = 15
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 365
  BYTES               = 1
  DESCRIPTION         = "
    Resettable actuator safing plug status, 1=instlled"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "NON_RST_ACT_SAFE"
  COLUMN_NUMBER       = 16
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 366
  BYTES               = 1
  DESCRIPTION         = "
    Non-resettable actuator safing plus status, 1=nstalled"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "SmInit"
  COLUMN_NUMBER       = 17
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 367
  BYTES               = 1
  DESCRIPTION         = "
    Scan Mirror movement control initialized: 1 = nitialized"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "SCAN_MRR_HTR"
  COLUMN_NUMBER       = 18
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 368
  BYTES               = 1
  DESCRIPTION         = " Status of scan mirror heater, 1=on"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "OAP_MRR_HTR"
  COLUMN_NUMBER       = 19
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 369
  BYTES               = 1
  DESCRIPTION         = " Status of the OAP mirror heater, 1=on"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "GRT_MRR_HTR"
  COLUMN_NUMBER       = 20
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 370
  BYTES               = 1
  DESCRIPTION         = " Status of the grating mirror heater, 1=on"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CMD_LAST_CYCLE"
  COLUMN_NUMBER         = 21
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 371
  BYTES                 = 1
  DESCRIPTION           = " 1=command received during last cycle"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "T_SYNC_MSG"
  COLUMN_NUMBER         = 22
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 372
  BYTES                 = 1
  DESCRIPTION           = "
    1=valid time sync message received during lastcycle"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "T_SYNC_PULSE"
  COLUMN_NUMBER         = 23
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 373
  BYTES                 = 1
  DESCRIPTION           = "
    1=valid time sync pulse received during last ccle"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CRIT_TC_PEND"
  COLUMN_NUMBER         = 24
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 374
  BYTES                 = 1
  DESCRIPTION           = " 1=critical telecommand pending"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "TC_STATUS"
  COLUMN_NUMBER         = 25
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 375
  BYTES                 = 1
  DESCRIPTION           = "
    Instrument commanding input wait status: 1 - pime first byte, 2 -
    redundant first byte, 3 - either first byte, 5 - prime next byte, 6 -
    redundant next byte"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CMDS_ACCEPTED"
  COLUMN_NUMBER         = 26
```

```
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 376
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of commands accepted"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "CMDS_REJECTED"
  COLUMN_NUMBER          = 27
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 377
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of commands rejected"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "CMDS_EXECUTED"
  COLUMN_NUMBER          = 28
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 378
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of commands executed"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "TIME_MSGS_RECVD"
  COLUMN_NUMBER          = 29
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 379
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of time messages received"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "TIME_PULSES_RECVD"
  COLUMN_NUMBER          = 30
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 380
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of time pulses received"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "NADIR_MSGS_RECVD"
  COLUMN_NUMBER          = 31
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 381
  BYTES                  = 1
  DESCRIPTION            = " Modulo 2^8 count of nadir messages received"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "LAST_ACCEPT_CMD"
  COLUMN_NUMBER          = 32
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
```

```
  START_BYTE            = 382
  BYTES                 = 1
  DESCRIPTION           = " Opcode of last accepted command"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "LAST_FAILED_CMD"
  COLUMN_NUMBER         = 33
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 383
  BYTES                 = 1
  DESCRIPTION           = " Opcode of last failed command"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "LAST_FAILURE"
  COLUMN_NUMBER         = 34
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 384
  BYTES                 = 1
  DESCRIPTION           = " Last failure code command/execution"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CRIT_CMD_TIMEOUT"
  COLUMN_NUMBER         = 35
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 385
  BYTES                 = 1
  DESCRIPTION           = " Remaining timeout for a critical command"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCI_PKT_HDR"
  COLUMN_NUMBER         = 36
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 386
  BYTES                 = 4
  DESCRIPTION           = "
    Header of the most recently acquired science pcket"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCI_QUALITY"
  COLUMN_NUMBER         = 37
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 390
  BYTES                 = 1
  DESCRIPTION           = "
    Quality byte of the most recent science acquistion"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCI_PKT_TAG"
  COLUMN_NUMBER         = 38
```

```
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 391
  BYTES                  = 2
  DESCRIPTION            = " Tag bytes of most recent science acquisition"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "DETECTOR_DOOR_POS"
  COLUMN_NUMBER          = 39
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 393
  BYTES                  = 1
  DESCRIPTION            = " 0=illegal, 1=not open, 2=open, 3=illegal"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "APERTURE_DOOR_POS"
  COLUMN_NUMBER          = 40
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 394
  BYTES                  = 1
  DESCRIPTION            = " 0=error, 1=closed, 2=open, 3=between"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HACKRATE"
  COLUMN_NUMBER          = 41
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 395
  BYTES                  = 1
  DESCRIPTION            = " 0=1ms, 1=2ms, ... 9=512ms"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HVPS_COMMANDED"
  COLUMN_NUMBER          = 42
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 396
  BYTES                  = 1
  DESCRIPTION            = " Commanded state of HVPS 1 and 2, 1=on"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HVPS_LIMITED"
  COLUMN_NUMBER          = 43
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 397
  BYTES                  = 1
  DESCRIPTION            = " 1=HVPS limited due to high countrate"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HOT_PIXEL_MASKING"
  COLUMN_NUMBER          = 44
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
```

```
  START_BYTE            = 398
  BYTES                 = 1
  DESCRIPTION           = " 1=hot pixel masking (hardware) active"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCI_OVERFLOW"
  COLUMN_NUMBER         = 45
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 399
  BYTES                 = 1
  DESCRIPTION           = "
    1=overflow occured in high speed science transer"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ACQ_MEM"
  COLUMN_NUMBER         = 46
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 400
  BYTES                 = 1
  DESCRIPTION           = " 0=side A, 1=side B"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "DETECTOR_STIM"
  COLUMN_NUMBER         = 47
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 401
  BYTES                 = 1
  DESCRIPTION           = " 0=STIM off, 1=STIM on"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "ACQ_EVT_POINTER"
  COLUMN_NUMBER         = 48
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 402
  BYTES                 = 2
  DESCRIPTION           = "
    Most recent value of the h/w pixel list pointe"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "FIRST_COUNT_HACK"
  COLUMN_NUMBER         = 49
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 404
  BYTES                 = 2
  DESCRIPTION           = "
    Value of the timehack counter at the first coutrate entry"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "RAW_EVENT_COUNT"
```

```
  COLUMN_NUMBER          = 50
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 406
  BYTES                  = 4
  DESCRIPTION            = "
    Current value of the hardware detector analog vent counter"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MAX_EVENT_RATE"
  COLUMN_NUMBER          = 51
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 410
  BYTES                  = 4
  DESCRIPTION            = "
    Maximum digital unmasked event rate in the lasHK cycle"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "MAX_MASK_RATE"
  COLUMN_NUMBER          = 52
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 414
  BYTES                  = 4
  DESCRIPTION            = "
    Maximum digital masking rate in the last HK cyle"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "ACQ_TIMEOUT"
  COLUMN_NUMBER          = 53
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 418
  BYTES                  = 4
  DESCRIPTION            = "
    Remianing time (sec) of acquisiton timeout couter"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "LAST_ACQ_COMPLETE_TIME"
  COLUMN_NUMBER          = 54
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 422
  BYTES                  = 4
  DESCRIPTION            = " Time of last acquisition completion"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "LOWER_DISCRIMINATOR"
  COLUMN_NUMBER          = 55
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 426
  BYTES                  = 1
  DESCRIPTION            = " Pulse height (0-31)"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "UPPER_DISCRIMINATOR"
  COLUMN_NUMBER         = 56
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 427
  BYTES                 = 1
  DESCRIPTION           = " Pulse height (0-31)"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "HVPS_SETPOINT"
  COLUMN_NUMBER         = 57
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 428
  BYTES                 = 8
  DESCRIPTION           = " DAC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "HVPS_LIMIT_TIMEOUT"
  COLUMN_NUMBER         = 58
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 436
  BYTES                 = 1
  DESCRIPTION           = " Remaining HVPS limit timeout in cycles"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MAX_MCP_VOLTAGE"
  COLUMN_NUMBER         = 59
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 437
  BYTES                 = 8
  DESCRIPTION           = "
    Maximum MCP voltage in this HK reporting perio"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MIN_MCP_VOLTAGE"
  COLUMN_NUMBER         = 60
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 445
  BYTES                 = 8
  DESCRIPTION           = "
    Minimum MCP voltage in this HK reporting perio"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MAX_ANODE_VOLTAGE"
  COLUMN_NUMBER         = 61
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 453
  BYTES                 = 8
```

```
  DESCRIPTION             = "
    Maximum anode voltage in this HK reporting perod"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MIN_ANODE_VOLTAGE"
  COLUMN_NUMBER           = 62
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 461
  BYTES                   = 8
  DESCRIPTION             = "
    Minimum anode voltage in this HK reporting perod"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MAX_STRIP_CURRENT"
  COLUMN_NUMBER           = 63
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 469
  BYTES                   = 8
  DESCRIPTION             = "
    Maximum strip current in this HK reporting perod"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MIN_STRIP_CURRENT"
  COLUMN_NUMBER           = 64
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 477
  BYTES                   = 8
  DESCRIPTION             = "
    Minimum strip current in this HK reporting perod"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "P7_VOLT"
  COLUMN_NUMBER           = 65
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 485
  BYTES                   = 8
  DESCRIPTION             = " ADC counts, range matching measure voltage"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "N7_VOLT"
  COLUMN_NUMBER           = 66
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 493
  BYTES                   = 8
  DESCRIPTION             = " ADC counts, range matching measure voltage"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "P5_VOLT"
  COLUMN_NUMBER           = 67
```

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  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 501
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "N5_VOLT"
  COLUMN_NUMBER          = 68
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 509
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "P3_3_VOLT"
  COLUMN_NUMBER          = 69
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 517
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "P1_8_VOLT"
  COLUMN_NUMBER          = 70
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 525
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "P1_5_VOLT"
  COLUMN_NUMBER          = 71
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 533
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "REF_0_3_VOLT"
  COLUMN_NUMBER          = 72
  DATA_TYPE              = IEEE_REAL
  START_BYTE             = 541
  BYTES                  = 8
  DESCRIPTION            = " ADC counts, range matching measure voltage"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "REF_2_7_VOLT"
  COLUMN_NUMBER          = 73
  DATA_TYPE              = IEEE_REAL
```

```
  START_BYTE            = 549
  BYTES                 = 8
  DESCRIPTION           = " ADC counts, range matching measure voltage"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SEQUENCER_ACTIVE"
  COLUMN_NUMBER         = 74
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 557
  BYTES                 = 1
  DESCRIPTION           = " 1=scan mirror sequencer active"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CURRENT_POSITION"
  COLUMN_NUMBER         = 75
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 558
  BYTES                 = 1
  DESCRIPTION           = " Current scan mriror position"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "END_SWTICHES_STAT"
  COLUMN_NUMBER         = 76
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 559
  BYTES                 = 1
  DESCRIPTION           = " 1=switch closed"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "TIME_TO_ZENITH"
  COLUMN_NUMBER         = 77
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 560
  BYTES                 = 1
  DESCRIPTION           = " Remaining time to zenith in sec*2"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "CURRENT_PHASE"
  COLUMN_NUMBER         = 78
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 561
  BYTES                 = 1
  DESCRIPTION           = " Current phsae within scan table"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "REM_PHASE_TIME"
  COLUMN_NUMBER         = 79
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 562
```

```
  BYTES                = 2
  DESCRIPTION          = " Time remaining in current phase in sec*2"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "ACT_SEQ_OFFSET"
  COLUMN_NUMBER        = 80
  DATA_TYPE            = LSB_UNSIGNED_INTEGER
  START_BYTE           = 564
  BYTES                = 1
  DESCRIPTION          = " Offset within the current sequence phase"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "ACT_SEQ_STEP"
  COLUMN_NUMBER        = 81
  DATA_TYPE            = LSB_UNSIGNED_INTEGER
  START_BYTE           = 565
  BYTES                = 1
  DESCRIPTION          = " Step within the current sequence phase"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "ACT_SEQ_CYCLE"
  COLUMN_NUMBER        = 82
  DATA_TYPE            = LSB_UNSIGNED_INTEGER
  START_BYTE           = 566
  BYTES                = 1
  DESCRIPTION          = "
    Cycles within the current sequence step phase"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "REM_DWELL"
  COLUMN_NUMBER        = 83
  DATA_TYPE            = LSB_UNSIGNED_INTEGER
  START_BYTE           = 567
  BYTES                = 1
  DESCRIPTION          = "
    Remaining number of dwell cycles at the currenposition"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "SCAN_MRR_HTR_SETPOINT"
  COLUMN_NUMBER        = 84
  DATA_TYPE            = IEEE_REAL
  START_BYTE           = 568
  BYTES                = 8
  DESCRIPTION          = " ADC counts"
END_OBJECT             = COLUMN
OBJECT                 = COLUMN
  NAME                 = "OAP_MRR_HTR_SETPOINT"
  COLUMN_NUMBER        = 85
  DATA_TYPE            = IEEE_REAL
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  START_BYTE            = 576
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "GRATING_HTR_SETPOINT"
  COLUMN_NUMBER         = 86
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 584
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCAN_MRR_PRIMARY_TMP"
  COLUMN_NUMBER         = 87
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 592
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "SCAN_MRR_SECONDARY_TMP"
  COLUMN_NUMBER         = 88
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 600
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "OAP_MRR_PRIMARY_TMP"
  COLUMN_NUMBER         = 89
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 608
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "OAP_MRR_SECONDARY_TMP"
  COLUMN_NUMBER         = 90
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 616
  BYTES                 = 8
  DESCRIPTION           = " ADC counts"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "GRATING_PRIMARY_TMP"
  COLUMN_NUMBER         = 91
  DATA_TYPE             = IEEE_REAL
  START_BYTE            = 624
```

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  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "GRATING_SECONDARY_TMP"
  COLUMN_NUMBER       = 92
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 632
  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "CDH_ELEC_TMP"
  COLUMN_NUMBER       = 93
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 640
  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "HVPS_TEMP"
  COLUMN_NUMBER       = 94
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 648
  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "LVPS_TEMP"
  COLUMN_NUMBER       = 95
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 656
  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "DETECTOR_BDY_TMP"
  COLUMN_NUMBER       = 96
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 664
  BYTES               = 8
  DESCRIPTION         = " ADC counts"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "DETECTOR_ELEC_TMP"
  COLUMN_NUMBER       = 97
  DATA_TYPE           = IEEE_REAL
  START_BYTE          = 672
  BYTES               = 8
```

```
  DESCRIPTION             = " ADC counts"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "SMIB_TEMP"
  COLUMN_NUMBER           = 98
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 680
  BYTES                   = 8
  DESCRIPTION             = " ADC counts"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "CHASSIS_TEMP"
  COLUMN_NUMBER           = 99
  DATA_TYPE               = IEEE_REAL
  START_BYTE              = 688
  BYTES                   = 8
  DESCRIPTION             = " ADC counts"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "HVPS_LIMIT_CYCLES"
  COLUMN_NUMBER           = 100
  DATA_TYPE               = LSB_UNSIGNED_INTEGER
  START_BYTE              = 696
  BYTES                   = 1
  DESCRIPTION             = "
    Number of remaining cycles in this acquisition"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "TEMP_SAFETY"
  COLUMN_NUMBER           = 101
  DATA_TYPE               = LSB_UNSIGNED_INTEGER
  START_BYTE              = 697
  BYTES                   = 1
  DESCRIPTION             = " 1=safety in effect"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "CYCLE_SAFETY"
  COLUMN_NUMBER           = 102
  DATA_TYPE               = LSB_UNSIGNED_INTEGER
  START_BYTE              = 698
  BYTES                   = 1
  DESCRIPTION             = " 1=safety in effect"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "ANODE_SAFETY"
  COLUMN_NUMBER           = 103
  DATA_TYPE               = LSB_UNSIGNED_INTEGER
  START_BYTE              = 699
  BYTES                   = 1
```

```
  DESCRIPTION            = " 1=safety in effect"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "STRIP_SAFETY"
  COLUMN_NUMBER          = 104
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 700
  BYTES                  = 1
  DESCRIPTION            = " 1=safety in effect"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HV_SAFETY"
  COLUMN_NUMBER          = 105
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 701
  BYTES                  = 1
  DESCRIPTION            = " 1=safety in effect"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "BRIGHT_SAFETY"
  COLUMN_NUMBER          = 106
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 702
  BYTES                  = 1
  DESCRIPTION            = " 1=safety in effect"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "UNSAFE_TIMER"
  COLUMN_NUMBER          = 107
  DATA_TYPE              = LSB_INTEGER
  START_BYTE             = 703
  BYTES                  = 2
  DESCRIPTION            = "
    Remaining unsafe period in seconds, 0=no safetactive"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SAFETY_OVERRIDE"
  COLUMN_NUMBER          = 108
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 705
  BYTES                  = 1
  DESCRIPTION            = "
    1=all safety handling is overridden (deactivatd)"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "TEMP_SAFETY_MASK"
  COLUMN_NUMBER          = 109
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 706
```

```
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "CYCLE_SAFETY_MASK"
  COLUMN_NUMBER      = 110
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 707
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "ANODE_SAFETY_MASK"
  COLUMN_NUMBER      = 111
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 708
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "STRIP_SAFETY_MASK"
  COLUMN_NUMBER      = 112
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 709
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "HV_SAFETY_MASK"
  COLUMN_NUMBER      = 113
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 710
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "BRIGHT_SAFETY_MASK"
  COLUMN_NUMBER      = 114
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 711
  BYTES              = 1
  DESCRIPTION        = " 1=masked"
END_OBJECT           = COLUMN
OBJECT               = COLUMN
  NAME               = "EXECUTING_CODE"
  COLUMN_NUMBER      = 115
  DATA_TYPE          = LSB_UNSIGNED_INTEGER
  START_BYTE         = 712
  BYTES              = 1
```

```
  DESCRIPTION            = "
    0=illegal, 1=PROM, ..., 5=RAM, ..., 11-14=EEPRM_1-4"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "HW_VERSION"
  COLUMN_NUMBER          = 116
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 713
  BYTES                  = 1
  DESCRIPTION            = " Board version ID"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SW_MAJOR_VER"
  COLUMN_NUMBER          = 117
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 714
  BYTES                  = 1
  DESCRIPTION            = " Build Number"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SW_MINOR_VER"
  COLUMN_NUMBER          = 118
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 715
  BYTES                  = 1
  DESCRIPTION            = " Version Number"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "TC_INT_OFF"
  COLUMN_NUMBER          = 119
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 716
  BYTES                  = 1
  DESCRIPTION            = "
    Interrupt disable for each TC receiver, 1=disaled"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SYNC_RECVD"
  COLUMN_NUMBER          = 120
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 717
  BYTES                  = 1
  DESCRIPTION            = "
    TSP received in last second for each TC receivr, 1=received"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "TC_FRAME_ERR"
  COLUMN_NUMBER          = 121
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
```

```
  START_BYTE            = 718
  BYTES                 = 1
  DESCRIPTION           = "
    Latched H/W frame error status for each TC reciver, 1=error"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "TC_OVERRUN_ERR"
  COLUMN_NUMBER         = 122
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 719
  BYTES                 = 1
  DESCRIPTION           = "
    Latched H/W frame error status for each TC rcv, 1=overrun"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MEM_CHKSUM"
  COLUMN_NUMBER         = 123
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 720
  BYTES                 = 2
  DESCRIPTION           = "
    Checksum calculated in response to last issuedcheck mem cmd"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "RTX_IDLE"
  COLUMN_NUMBER         = 124
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 722
  BYTES                 = 2
  DESCRIPTION           = "
    Count of passes through the scheduler idle loo"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "RTX_SCHEDULER"
  COLUMN_NUMBER         = 125
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 724
  BYTES                 = 2
  DESCRIPTION           = " Count of calls to scheduler"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "DEBUG_ARRAY"
  COLUMN_NUMBER         = 126
  DATA_TYPE             = LSB_UNSIGNED_INTEGER
  START_BYTE            = 726
  BYTES                 = 10
  DESCRIPTION           = " Various debug information fields"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
```

```
  NAME                = "MIN_FREE_STACK"
  COLUMN_NUMBER           = 127
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 736
  BYTES               = 1
  DESCRIPTION           = " Minimum amount of free stack space detected"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "FIRST_DELETED"
  COLUMN_NUMBER           = 128
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 737
  BYTES               = 1
  DESCRIPTION           = " Task number of the first deleted task"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "RAM_EDAC_RECOVER"
  COLUMN_NUMBER           = 129
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 738
  BYTES               = 1
  DESCRIPTION           = " Number of recovered RAM errors"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "RAM_EDAC_FAIL"
  COLUMN_NUMBER           = 130
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 739
  BYTES               = 1
  DESCRIPTION           = " Number of detected RAM errors"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EEPROM_EDAC_RECOVER"
  COLUMN_NUMBER           = 131
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 740
  BYTES               = 1
  DESCRIPTION           = " Number of recovered EEPROM errors"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "EEPROM_EDAC_FAIL"
  COLUMN_NUMBER           = 132
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE           = 741
  BYTES               = 1
  DESCRIPTION           = " Number of detected EEPROM errors"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "TEST_STATUS"
```

```
  COLUMN_NUMBER          = 133
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 742
  BYTES                  = 2
  DESCRIPTION            = " Test result of commanded self test"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SCRUBBER_CYCLES"
  COLUMN_NUMBER          = 134
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 744
  BYTES                  = 2
  DESCRIPTION            = " Number of EDAC scrubber cycles completed"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "SLOW_TASK_STATUS"
  COLUMN_NUMBER          = 135
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 746
  BYTES                  = 1
  DESCRIPTION            = "
    0=start,1=idle,2=mem chk,3=mem dump,4=mem load5=acq,6=test"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "WATCHDOG_CNT_MAXED"
  COLUMN_NUMBER          = 136
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 747
  BYTES                  = 1
  DESCRIPTION            = " Watchdog expiration count above 15"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "WATCHDOG_EXP_COUNT"
  COLUMN_NUMBER          = 137
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 748
  BYTES                  = 1
  DESCRIPTION            = "
    Number of watchdog expirations since last powe-on, mod16"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
  NAME                   = "PARAMETER_INDEX"
  COLUMN_NUMBER          = 138
  DATA_TYPE              = LSB_UNSIGNED_INTEGER
  START_BYTE             = 749
  BYTES                  = 1
  DESCRIPTION            = " Last requested parameter index"
END_OBJECT               = COLUMN
OBJECT                   = COLUMN
```

```
  NAME                = "PARAMETER_VALUE"
  COLUMN_NUMBER       = 139
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 750
  BYTES               = 1
  DESCRIPTION         = " Current value of last requested parameter"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "HK_PKT_CHKSUM"
  COLUMN_NUMBER       = 140
  DATA_TYPE           = LSB_UNSIGNED_INTEGER
  START_BYTE          = 751
  BYTES               = 2
  DESCRIPTION         = "
    Calculated checksum before sending HK data to /C"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "CLOCK_PERIOD"
  COLUMN_NUMBER       = 141
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 753
  BYTES               = 4
  DESCRIPTION         = " Clock period assigned to HK"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "CHKSUM_ERROR"
  COLUMN_NUMBER       = 142
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 757
  BYTES               = 2
  DESCRIPTION         = "
    Difference between computed and expected packechksum"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AVR_RAW_RATE"
  COLUMN_NUMBER       = 143
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 759
  BYTES               = 4
  DESCRIPTION         = " Average raw countrate in Hz"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "AVR_EVENT_RATE"
  COLUMN_NUMBER       = 144
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 763
  BYTES               = 4
  DESCRIPTION         = " Average event rate in Hz"
END_OBJECT            = COLUMN
```

```
END_OBJECT                = HOUSEKEEPING_TABLE

OBJECT                    = WAVELENGTH_LOOKUP_HEADER
  BYTES                   = 2880 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE             = FITS
  INTERCHANGE_FORMAT      = BINARY
  RECORDS                 = 1
  DESCRIPTION             = "
    This is the FITS header for FITS extension number = 9, FITS extension name
    = WAVELENGTH_LOOKUP_IMAGE"
END_OBJECT                = WAVELENGTH_LOOKUP_HEADER

OBJECT                    = WAVELENGTH_LOOKUP_IMAGE
  SAMPLE_BITS             = 32
  SAMPLE_TYPE             = MSB_INTEGER
  AXIS_ORDER_TYPE         = FIRST_INDEX_FASTEST
  LINE_DISPLAY_DIRECTION  = UP
  SAMPLE_DISPLAY_DIRECTION = RIGHT
  LINE_SAMPLES            = 2048
  LINES                   = 256
  INTERCHANGE_FORMAT      = BINARY
  OFFSET                  = 0
  SCALING_FACTOR          = 1.00000
  DESCRIPTION             = "
    This dataset contains a 2048 x 256 image whose floating-point pixel values
    are the wavelengths corresponding to the pixel locations on the detector."
END_OBJECT                = WAVELENGTH_LOOKUP_IMAGE

OBJECT                    = MASK_INFORMATION_HEADER
  BYTES                   = 8640 /* RECORD_BYTES x RECORDS */
  HEADER_TYPE             = FITS
  INTERCHANGE_FORMAT      = BINARY
  RECORDS                 = 3
  DESCRIPTION             = "
    This is the FITS header for FITS extension number = 10, FITS extension
    name = MASK_INFORMATION"
END_OBJECT                = MASK_INFORMATION_HEADER

OBJECT                    = MASK_INFORMATION_TABLE
  INTERCHANGE_FORMAT      = BINARY
  ROWS                    = 25
  COLUMNS                 = 36
  ROW_BYTES               = 124
  OBJECT                  = COLUMN
    NAME                  = "PLANNED_START_UTC"
    COLUMN_NUMBER         = 1
    DATA_TYPE             = CHARACTER
    START_BYTE            = 1
    BYTES                 = 20
```

```
  DESCRIPTION             = "
    Estimated start time from planning information"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "PLANNED_STOP_UTC"
  COLUMN_NUMBER           = 2
  DATA_TYPE               = CHARACTER
  START_BYTE              = 21
  BYTES                   = 20
  DESCRIPTION             = "Estimated stop time from planning information"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MASK_NAME"
  COLUMN_NUMBER           = 3
  DATA_TYPE               = CHARACTER
  START_BYTE              = 41
  BYTES                   = 10
  DESCRIPTION             = "Mask Name"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "DATA_TAG"
  COLUMN_NUMBER           = 4
  DATA_TYPE               = CHARACTER
  START_BYTE              = 51
  BYTES                   = 10
  DESCRIPTION             = "Data Tag"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK1_X_START"
  COLUMN_NUMBER           = 5
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 61
  BYTES                   = 2
  DESCRIPTION             = "Mask 1 X Start"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK1_X_STOP"
  COLUMN_NUMBER           = 6
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 63
  BYTES                   = 2
  DESCRIPTION             = "Mask 1 X Stop"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK1_Y_START"
  COLUMN_NUMBER           = 7
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 65
  BYTES                   = 2
```

```
  DESCRIPTION             = "Mask 1 Y Start"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK1_Y_STOP"
  COLUMN_NUMBER           = 8
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 67
  BYTES                   = 2
  DESCRIPTION             = "Mask 1 Y Stop"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK2_X_START"
  COLUMN_NUMBER           = 9
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 69
  BYTES                   = 2
  DESCRIPTION             = "Mask 2 X Start"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK2_X_STOP"
  COLUMN_NUMBER           = 10
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 71
  BYTES                   = 2
  DESCRIPTION             = "Mask 2 X Stop"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK2_Y_START"
  COLUMN_NUMBER           = 11
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 73
  BYTES                   = 2
  DESCRIPTION             = "Mask 2 Y Start"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK2_Y_STOP"
  COLUMN_NUMBER           = 12
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 75
  BYTES                   = 2
  DESCRIPTION             = "Mask 2 Y Stop"
END_OBJECT                = COLUMN
OBJECT                    = COLUMN
  NAME                    = "MSK3_X_START"
  COLUMN_NUMBER           = 13
  DATA_TYPE               = LSB_INTEGER
  START_BYTE              = 77
  BYTES                   = 2
  DESCRIPTION             = "Mask 3 X Start"
```

```
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK3_X_STOP"
  COLUMN_NUMBER         = 14
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 79
  BYTES                 = 2
  DESCRIPTION           = "Mask 3 X Stop"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK3_Y_START"
  COLUMN_NUMBER         = 15
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 81
  BYTES                 = 2
  DESCRIPTION           = "Mask 3 Y Start"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK3_Y_STOP"
  COLUMN_NUMBER         = 16
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 83
  BYTES                 = 2
  DESCRIPTION           = "Mask 3 Y Stop"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK4_X_START"
  COLUMN_NUMBER         = 17
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 85
  BYTES                 = 2
  DESCRIPTION           = "Mask 4 X Start"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK4_X_STOP"
  COLUMN_NUMBER         = 18
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 87
  BYTES                 = 2
  DESCRIPTION           = "Mask 4 X Stop"
END_OBJECT              = COLUMN
OBJECT                  = COLUMN
  NAME                  = "MSK4_Y_START"
  COLUMN_NUMBER         = 19
  DATA_TYPE             = LSB_INTEGER
  START_BYTE            = 89
  BYTES                 = 2
  DESCRIPTION           = "Mask 4 Y Start"
END_OBJECT              = COLUMN
```

```
OBJECT                = COLUMN
  NAME                = "MSK4_Y_STOP"
  COLUMN_NUMBER       = 20
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 91
  BYTES               = 2
  DESCRIPTION         = "Mask 4 Y Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK5_X_START"
  COLUMN_NUMBER       = 21
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 93
  BYTES               = 2
  DESCRIPTION         = "Mask 5 X Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK5_X_STOP"
  COLUMN_NUMBER       = 22
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 95
  BYTES               = 2
  DESCRIPTION         = "Mask 5 X Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK5_Y_START"
  COLUMN_NUMBER       = 23
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 97
  BYTES               = 2
  DESCRIPTION         = "Mask 5 Y Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK5_Y_STOP"
  COLUMN_NUMBER       = 24
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 99
  BYTES               = 2
  DESCRIPTION         = "Mask 5 Y Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK6_X_START"
  COLUMN_NUMBER       = 25
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 101
  BYTES               = 2
  DESCRIPTION         = "Mask 6 X Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
```

```
  NAME                = "MSK6_X_STOP"
  COLUMN_NUMBER       = 26
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 103
  BYTES               = 2
  DESCRIPTION         = "Mask 6 X Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK6_Y_START"
  COLUMN_NUMBER       = 27
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 105
  BYTES               = 2
  DESCRIPTION         = "Mask 6 Y Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK6_Y_STOP"
  COLUMN_NUMBER       = 28
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 107
  BYTES               = 2
  DESCRIPTION         = "Mask 6 Y Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK7_X_START"
  COLUMN_NUMBER       = 29
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 109
  BYTES               = 2
  DESCRIPTION         = "Mask 7 X Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK7_X_STOP"
  COLUMN_NUMBER       = 30
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 111
  BYTES               = 2
  DESCRIPTION         = "Mask 7 X Stop"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK7_Y_START"
  COLUMN_NUMBER       = 31
  DATA_TYPE           = LSB_INTEGER
  START_BYTE          = 113
  BYTES               = 2
  DESCRIPTION         = "Mask 7 Y Start"
END_OBJECT            = COLUMN
OBJECT                = COLUMN
  NAME                = "MSK7_Y_STOP"
```

```
    COLUMN_NUMBER          = 32
    DATA_TYPE              = LSB_INTEGER
    START_BYTE             = 115
    BYTES                  = 2
    DESCRIPTION            = "Mask 7 Y Stop"
  END_OBJECT               = COLUMN
  OBJECT                   = COLUMN
    NAME                   = "MSK8_X_START"
    COLUMN_NUMBER          = 33
    DATA_TYPE              = LSB_INTEGER
    START_BYTE             = 117
    BYTES                  = 2
    DESCRIPTION            = "Mask 8 X Start"
  END_OBJECT               = COLUMN
  OBJECT                   = COLUMN
    NAME                   = "MSK8_X_STOP"
    COLUMN_NUMBER          = 34
    DATA_TYPE              = LSB_INTEGER
    START_BYTE             = 119
    BYTES                  = 2
    DESCRIPTION            = "Mask 8 X Stop"
  END_OBJECT               = COLUMN
  OBJECT                   = COLUMN
    NAME                   = "MSK8_Y_START"
    COLUMN_NUMBER          = 35
    DATA_TYPE              = LSB_INTEGER
    START_BYTE             = 121
    BYTES                  = 2
    DESCRIPTION            = "Mask 8 Y Start"
  END_OBJECT               = COLUMN
  OBJECT                   = COLUMN
    NAME                   = "MSK8_Y_STOP"
    COLUMN_NUMBER          = 36
    DATA_TYPE              = LSB_INTEGER
    START_BYTE             = 123
    BYTES                  = 2
    DESCRIPTION            = "Mask 8 Y Stop"
  END_OBJECT               = COLUMN
END_OBJECT                 = MASK_INFORMATION_TABLE

END
```