

Cassini Composite Infrared Spectrometer (CIRS)

Planetary Data System (PDS)
Time Sequential Data Record (TSDR)
Data Product Software Interface Specification (SIS)

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1 Introduction

This document describes the format and content of the Cassini Composite Infrared Spectrometer (CIRS) Time Sequential Data Record (TSDR) products, as archived to the Planetary Data System (PDS). The aim of this document is to provide a user guide for persons accessing and using the archived data.

Acknowledgment

The heritage of the CIRS ground data system draws heavily on the experience and tools developed by the Mars Global Surveyor Thermal Emission Spectrometer (MGS TES) team. Their database utility ‘Vanilla’ is used as a core access tool by the CIRS team. In addition, the authors have drawn on the TES-TSDR Standard Data Product SIS as a template and starting point for this document.

1.1 Revision Notes

- 2014-11-28, M. Kaelberer, edits for version 3.2 of the PDS archive and an update for the Interferences and Noises section.
- 2018-02-09, M. Kaelberer, edits for version 4.0 of the PDS archive (new fields, new table, format files updated).

2 Data Overview

2.1 CIRS Instrument

CIRS is a Fourier Transform Spectrometer, and a dual interferometer by design (see Kunde et al 1996, Flasar et al 2004). In the mid-infrared, a conventional Michelson mirror arrangement is terminated by dual 10-element detector arrays. The 10 photoconductive (PC) detectors of focal plane 3 (FP3) have a bandpass of 600–1100 cm^{-1} approximately, and the 10 photovoltaic detectors of focal plane 4 (FP4) are sensitive from 1000–1500 cm^{-1} . Each of the 20 MIR detectors has a square field of view (FOV) which is 0.273 milliradian across.

In the far-infrared, a Martin-Puplett type (Martin and Puplett 1969) polarizing interferometer conveys the radiation onto two redundant thermopile detectors, one sensitive to the transmitted and one to the reflected beam at the final polarizer-analyzer. Each detector has a circular FOV of full width to half maximum (FWHM) 2.4 milliradians. Each covers the spectral range 10–600 cm^{-1} , and are known as FP1.¹

CIRS records interferograms (IFMs) at varying resolution: from 0.5 cm^{-1} to 15.5 cm^{-1} . The resolution is determined by the scan distance (time), normally commanded in units

¹In the original design for CIRS, a second FIR detector (FP2) was planned; but this was later removed during a de-scope exercise.

of 1/8 second (=1 RTI, or ‘Real Time Interrupt’). The valid range of RTIs is 36 to 416. The resolution is approximately inversely proportional to the scan time, although in fact the relationship is non-linear, especially at short scan times (see Figure 1). This is due to (i) mirror flyback time, which is included in the commanded scan time, and (ii) mirror acceleration and deceleration to constant-velocity scanning.

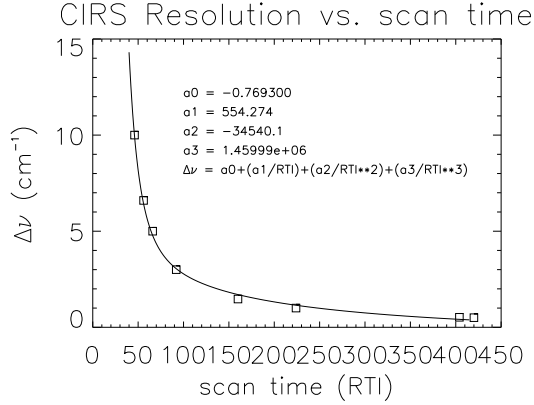


Figure 1: CIRS resolution vs scan time.

2.2 CIRS MIR Observing Modes

In the mid-IR, CIRS has only five channels with active bandpass filters for each of FP3 and FP4. While each array has 10 detectors, only 5 detectors from each array can be recorded per scan.

There are four pre-programmed observing modes (see figure 2):

ODD Detectors 1, 3, 5, 7, 9 active on each array.

EVEN Detectors 2, 4, 6, 8, 10 active on each array.

CENTER Detectors 4–8 (FP3) and 3–7 (FP4) active on each array.

PAIRS The signal from the detectors is combined pairwise before signal processing; so 1&2 are paired etc, through 9&10.

The result is that CIRS normally writes 11 IFMs at a time to the Bus Interface Unit (BIU): 1 from FP1, 5 from each of FP3 and FP4. However, there are reduced data modes where only 6 (FP1 plus either FP3 or FP4) or 1 (FP1) channels are written. Note that, in addition, CIRS may be commanded to co-add IFMs pairwise in time, with the result that data are only written on alternate scans. This achieves a 50% reduction in data volume if and when required, at the cost of possible ‘smear’ of spatial field if the spacecraft is scanning.

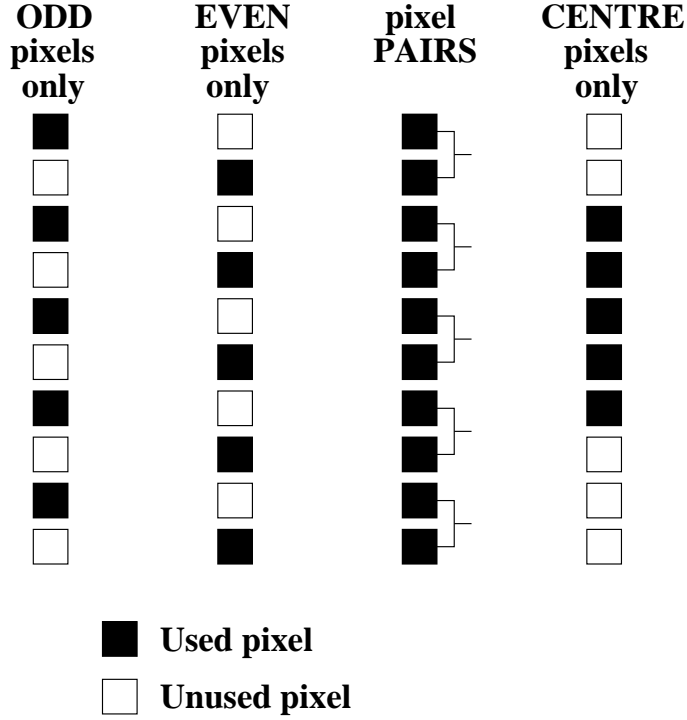


Figure 2: CIRS pixel switching modes.

2.3 Standards Used in Generating Data Products

2.3.1 Time Standards

The primary key field, used to cross-link CIRS data in different files together, is *spacecraft event time* (SCET) stored as an integer number of seconds since 1/1/1970 00:00:00 UT, ignoring leap seconds. Also stored as a retrievable field, but not a key field, is *spacecraft clock* (SCLK), and the SCLK partition number. These are stored as two integers.

SCLK is essentially an integer number related to oscillations of the on-board quartz crystal clock. Partition number is advanced by one when the SCLK count is reset, expected to be a rare event, if ever. SCLK ticks are not even linearly related to universal time, and the conversion between the two requires a polynomial to account for drifts in the SCLK oscillation frequency. SCET on the other hand *is* linearly related to universal time.

SCET is used as the primary time key field rather than SCLK for two reasons: firstly, SCLK may reset, and not be monotonically increasing, in which case the partition number also changes; and secondly, SCET may easily and conveniently be converted to text time using standard computer library functions, whereas interpreting SCLK requires the NAIF toolkit and Cassini time kernel (SCLKSCET) files.

At the time of writing, standard computer library routines are available which facilitate the conversion to and from text time to SCET number, such as the C call to `gmtime`. Example source code for this operation is included in Appendix B.

2.3.2 Co-ordinate Systems

In general, our conventions will follow the Cassini Archive Plan for Science Data: refer to that document for further details.

Jupiter: System III west longitude and planetographic latitude.

Titan: Titan longitude is the standard Longitude of Central Meridian (West Longitude) with the origin in the Saturn-facing direction of synchronous rotation. Latitude is relative to a spherical body at the time of writing: hence the planetographic/planetocentric dichotomy does not occur.

Saturn: System III west longitude and planetographic latitude.

Rings: see appendices.

Icy Satellites: standard Cassini definitions will be applied (see the APSD document).

2.3.3 Orbit Numbers (revs)

We use Cassini orbit numbers, as determined by the Cassini project.

2.3.4 Data Storage Conventions

CIRS data is produced on PC-type machines using, at the time of writing, 32 bit Intel CPU's of either the Pentium or Xeon class. These chips use the LSB (least significant byte) storage convention. More details can be found in Appendix C of the PDS Standards Reference document.

2.4 Interferences and Noises

CIRS interferogram data suffers from a number of external interferences, especially:

- An 8 Hz spike pattern due to the spacecraft clock ticks.
- A 1/2 Hz spike pattern due to the Bus Interface Unit, transfer of data.
- A sine wave of variable frequency which appears correlated with the electronics board temperature.
- Scan speed fluctuations which have been traced to two mechanical vibrations on the spacecraft: (a) the MIMI LEMMS actuator (b) the reaction wheels used to turn the spacecraft.
- A 1 Hz spike pattern from the analog multiplexor data readouts.

- An 8.3 Hz spike pattern from an unknown source.

These various effects, plus the onboard and on-ground processing done to mitigate them, are described in more detail in the `cirs_interferences.pdf`, `CIRS-USER-GUIDE.PDF`, and `CirsNoise.pdf` documents found in the `DOCUMENT` directory.

3 Data Detailed Description

3.1 Logical Table and Physical Organisation

The dataset is conceptually one huge table, with records ('rows') time-ordered, and containing many fields ('columns'). In practice, this large 'virtual' (or 'logical') table is stored in multiple files, known as fragments. This 'physical' table is fragmented both in the 'row' and 'column' sense.

Table fragments have name stems of the form `NNYYMMDDHH`, where 'NNN' is a fragment type descriptor, such as 'OBS' indicating observation parameters, and 'IFGM' indicating interferogram data. The remainder of the stem is a time period: year (YY), month (MM), day (DD) and hour (HH) corresponding to the start of the data period covered. CIRS data typically is divided into 4-hour blocks at the uncalibrated level and 24-hour blocks at the calibrated level, although there may be exceptions. Normally this division is transparent to the user in any case, because Vanilla treats all separate files as forming part of a single, huge logical search table.

Each fragment stem has a file extension '.DAT' if it contains only fixed-length fields. If it contains both fixed length and variable length fields, then fragments with both '.DAT' and '.VAR' will be written for that stem name. The '.DAT' portion of a variable length fragment specifies the location of the variable length data in the '.VAR' file.

See figure 3 for schematic.

Fixed length files are designed to contain data fields of unvarying length. These items include fixed byte-size scalar values such as detector number, scet time, number of points in the IFM etc, and also fixed-size vectors such as the distance to the target surface for each of the nine Q-points in each detector.

The variable length files contain vector types which may vary in length. The archetypal examples of variable-length vector fields are the interferograms and spectra. For a Fourier transform spectrometer, higher spectral resolution is achieved by sampling a greater path difference within the interferometer, resulting in an increase in the number of points in the interferogram. CIRS has a variable spectral resolution ranging from 0.5 cm⁻¹ to 15.5 cm⁻¹ (apodized) depending on the commanded scan length. Hence the need for variable-length vector fields - if these were stored as fixed-length vectors padded with zeroes, it would result in extremely inefficient storage.

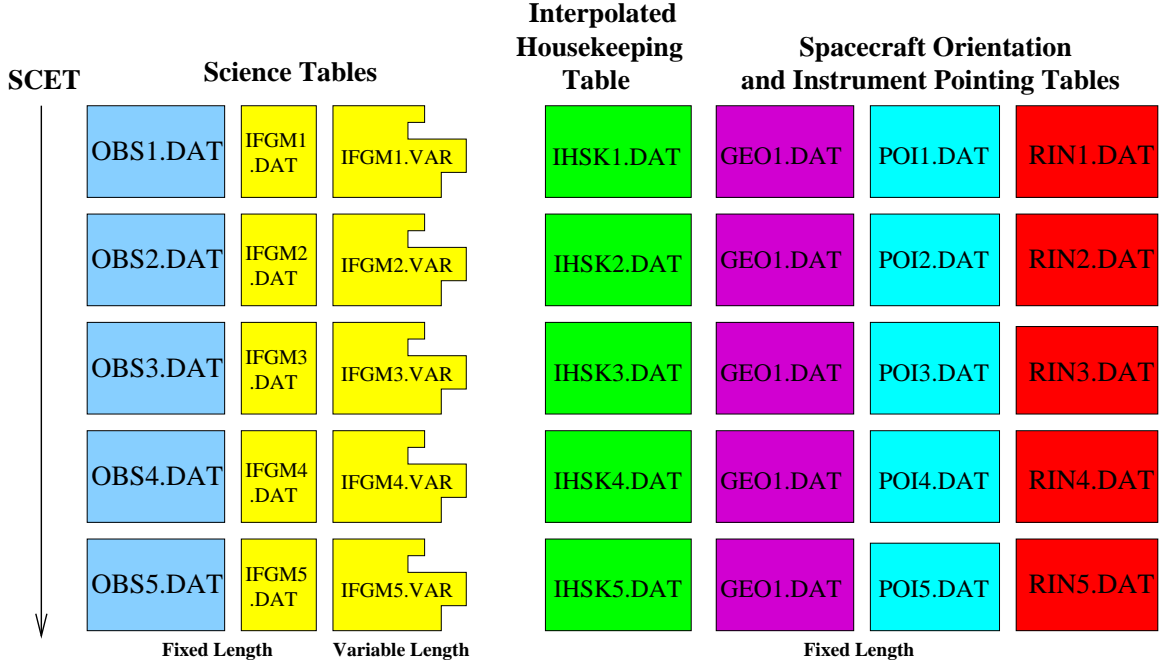


Figure 3: CIRS data file fragments.

3.2 Fields and Key Fields

As mentioned above, each fragment type stores different fields of the table. For example, while the ‘OBS’ (observation parameters) fragment may store the MIR shutter open/closed status, the ‘HSK’ (housekeeping) fragment may store the temperature of the primary mirror. All fragments generally store unique information, not contained in other fragments. The exceptions to this are the so-called ‘key fields’, which provide the row indexing.

The primary key field is **scet** - the spacecraft event time, stored as a number of seconds since the start of 1970. However, as CIRS simultaneously records 11 IFMs, the time alone is not enough to uniquely label an IFM. Hence, a unique detector id is used, as listed in Table 1. Note that the same physical detector is treated separately depending on whether it is being used in ODD/EVEN or CENTER mode. This is due to the fact that the signal will be processed by a different receiver channel in the electronics in the two cases, and so they must be calibrated separately. The physical layout of the detectors is shown in Figure 4.

As well as spectral information, the table stores pointing information for the detectors at the time of observation. This information is generated on the ground from the reconstructed c-kernels provided by JPL, in association with the instrument frames kernel.

However, a further degeneracy may be introduced into the data, if multiple targets appear in a single FOV. We must find a way to specify multiple pointings for say, a moon, which appears superimposed on the parent planet. Hence, the third key field is the target id.²

²The target id field is called ‘body id’ when it occurs in the GEO tables, to distinguish objects which may or may not be in the FOV (‘bodies’) from objects which are definitely in the FOV (‘targets’).

Focal Plane	Observing Mode	Detector Number	Database ID Code
1	ALL	1	0
3	PAIR	1 & 2	1
3	PAIR	3 & 4	2
3	PAIR	5 & 6	3
3	PAIR	7 & 8	4
3	PAIR	9 & 10	5
3	CENTER	4	6
3	CENTER	5	7
3	CENTER	6	8
3	CENTER	7	9
3	CENTER	8	10
3	ODD	1	11
3	EVEN	2	12
3	ODD	3	13
3	EVEN	4	14
3	ODD	5	15
3	EVEN	6	16
3	ODD	7	17
3	EVEN	8	18
3	ODD	9	19
3	EVEN	10	20
4	ODD	1	21
4	EVEN	2	22
4	ODD	3	23
4	EVEN	4	24
4	ODD	5	25
4	EVEN	6	26
4	ODD	7	27
4	EVEN	8	28
4	ODD	9	29
4	EVEN	10	30
4	CENTER	3	31
4	CENTER	4	32
4	CENTER	5	33
4	CENTER	6	34
4	CENTER	7	35
4	PAIR	1 & 2	36
4	PAIR	3 & 4	37
4	PAIR	5 & 6	38
4	PAIR	7 & 8	39
4	PAIR	9 & 10	40

Table 1: Detector ID specifications in the database.

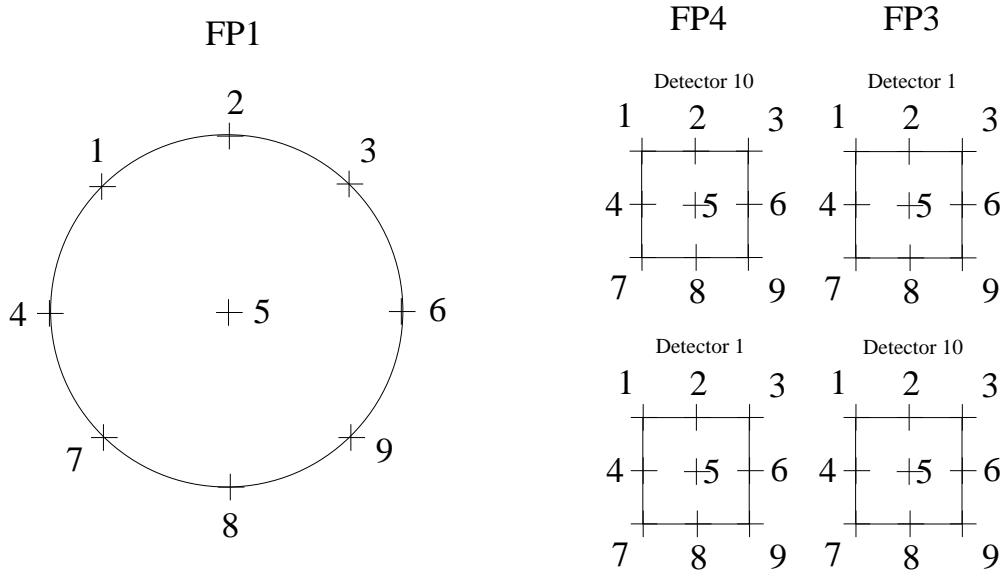
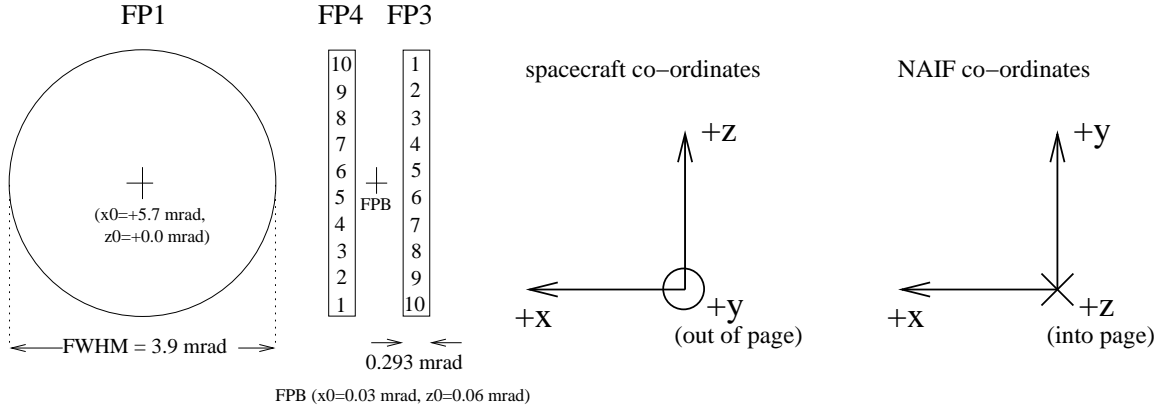


Figure 4: Q-points for CIRS detectors.

Thus a maximum of 3 key fields uniquely determine a row in the table. A given data fragment will store the key fields sufficient to uniquely identify the data within. For example, the OBS fragment stores SCET only, the IFGM fragment stores SCET and DET, while the POI stores SCET, DET and TARGET_ID (see Table 2).

Table Type	SCET	DET	Key fields TARGET_ID	BODY_ID
AIFM	X	X		
GEO	X			X
IFGM/FIFM	X	X		
IHSK/HSK	X			
OBS	X			
POI	X	X	X	
RIN	X	X		
SPM/ISPM	X	X		
TAR	X	X		

Table 2: Key fields for different file types.

The field BODY_ID, as used in the GEO tables, is similar to the TARGET_ID used in the POI tables. The main difference is that GEO table contains positional information for a subset of large bodies (primary planet, larger moons) with respect to the spacecraft, *whether or not* they are in the instrument FOV. The POI tables on the other hand store pointing information for all bodies which enter one or more of the FOVs. Hence, the list of bodies is different in the two cases, and a different keyword must be used to separate between the two.

3.3 Fixed-Length Data File Format

When we say ‘fixed-length’ file format in this document, we refer to the record, not the file. For example, suppose the record consists of 10, 4-byte numbers, for a total fixed-length of 40 bytes. In addition, once defined, field widths from record to record can not change. However, the size of the file (number of records) can and will vary between instances of that file type. One file may have 100 fixed-length records, another 300.

Fixed-length data record files (.DAT type) store much of the CIRS pointing, geometry, housekeeping and some science data fields. The other main type of data files are the variable-length data files (.VAR type), which act as extensions to the fixed-length data files and are described below. Both file types are binary, written in PC encoding (LSB).

Each record in a fixed-length record file consists of a number of fields. The field widths are fixed, and every field is written for every record. The field layout of each type of fixed-format data files is give in a format file (.FMT), which are re-produced in Appendix C. Format files also form an integral part of the Vanilla database, and hence there is always a copy of the requisite format files in each data subdirectory.

Important Note: fields are written to the file with the exact byte-lengths described in

the format files. Depending on which system, language and compiler is used to read/write the binary data, this will usually mean that each field must be read/written by a single command statement, rather than read/writing the entire record at a time, using a data 'structure'. Structures are often padded, so that a 1-byte number may be read/written as 4-bytes for example, if it occurs next to 4-byte integers in a structure. The code used to write CIRS data is all written in the (ANSI) C-language, and the subroutines are all included in the SOFTWARE/SRC directory of each volume.

3.4 PDS Label Files

Each fixed-format binary data file (.DAT type) is accompanied by an ASCII label file (.LBL type) containing key fields written in PDS3 Object Description Language (ODL) format. An example is:

```

PDS_VERSION_ID          = PDS3
INSTRUMENT_HOST_NAME    = "CASSINI ORBITER"
INSTRUMENT_NAME         = "COMPOSITE INFRARED SPECTROMETER"
MISSION_PHASE_NAME      = "JUPITER CRUISE"
DATA_SET_ID             = "CO-J-CIRS-2/3/4-TSDR-V1.0"
PRODUCT_ID              = "CIRS-ISPM01013000"
STANDARD_DATA_PRODUCT_ID = "CIRS-ISPM"
NOTE                    = "Created by Conor A Nixon.
      MD5 checksum of table = 0fe68fbbba98e8869724a7f58e60232f2
      NAIF toolkit version = N0054"
PRODUCT_CREATION_TIME   = 2003-10-29T22:21:58
SPACECRAFT_CLOCK_START_COUNT = "1/1359504733.204"
SPACECRAFT_CLOCK_STOP_COUNT = "1/1359590206.099"
START_TIME              = 2001-01-30T00:00:18
STOP_TIME               = 2001-01-30T23:44:50
SPICE_PRODUCT_ID        = { "cas_cirs_v05.ti", "cas_v28_mod.tf",
      "naif0007.tls", "pck00007.tpc",
      "010420R_SCPSE_EP1_JP83.bsp", "SCLK.ker",
      "010129_010201rb.bc" }
TARGET_NAME             = { JUPITER }
OBJECT                  = FILE
      ^TABLE              = "ISPM01013000.DAT"
      FILE_NAME           = "ISPM01013000.DAT"
      RECORD_TYPE         = FIXED_LENGTH
      RECORD_BYTES        = 45
      FILE_RECORDS        = 3478
      OBJECT              = TABLE
            NAME           = ISPM
            INTERCHANGE_FORMAT = BINARY
            ^STRUCTURE     = "ISPM.FMT"
            START_PRIMARY_KEY = (980812818)
            STOP_PRIMARY_KEY  = (980898290)

```

```

        PRIMARY_KEY      = ( "SCET", "DET" )
        ROWS              = 3478
    END_OBJECT           = TABLE
END_OBJECT              = FILE
OBJECT                  = FILE
    FILE_NAME            = "ISPM01013000.VAR"
    RECORD_TYPE          = UNDEFINED
    DESCRIPTION          = "This file contains variable length spectra
                           which can be read using the Vanilla
                           software package. See the Vanilla software
                           documentation for details."
END_OBJECT              = FILE
END

```

These fields are interpreted as follows:

PDS_VERSION_ID, RECORD_TYPE	standard items.
INSTRUMENT_HOST_NAME,	
INSTRUMENT_NAME	spacecraft and instrument name.
MISSION_PHASE_NAME	mission phase.
DATA_SET_ID, PRODUCT_ID,	data set id; product id.
STANDARD_DATA_PRODUCT_ID	standard data product id.
NOTE	data creating person; MD5 checksum; NAIF version
PRODUCT_CREATION_TIME	data creation time.
SPACECRAFT_CLOCK_START_COUNT,	
SPACECRAFT_CLOCK_STOP_COUNT	values of the spacecraft clock for the first and last records in this file.
START_TIME, STOP_TIME	as previous, but in UTC time rather than seconds since epoch.
SPICE_PRODUCT_ID	IDs of SPICE kernels used in pointing.
TARGET_NAME	target name.
Lines 21-36	description of table object (.DAT file contents).
TABLE	pointer to start record of table object.
FILE_NAME	name of this file, in the format: [type]YYMMDDHH where YYMMDD is the year-month-day of the science data and HH is the hour of the data start.
RECORD_TYPE	file is fixed-length records.
RECORD_BYTES	number of bytes per record.
FILE_RECORDS	number of data records in file.
STRUCTURE	file name of table format description.
PRIMARY_KEY	names of key fields, primary key first.
Lines 37-44	description of variable-length record file.

3.5 Variable-length Data File Format

When a particular table fragment type contains variable-length data, then only a pointer is stored in the '.DAT' file. The actual variable-length data is contained in a file having the same name, except that the extension is '.VAR'. E.g. a table fragment 'IFGM0001.DAT' would be accompanied by 'IFGM0001.VAR'.

In the variable-length data file, each record starts at the byte position indicated for that record in the '.DAT' file. Preceding, and following the actual data is a 2-byte integer giving the length in bytes. E.g. if the first record in the file was a spectrum of 32 4-byte floats, the first two bytes in the file would be the short integer '32', followed by the 32 4-byte floats, followed by the 2-byte number '32' again.

In the fixed-length file, the first pointer would be 0 (NULL), the second pointer would be $132 = 2 + (32 * 4) + 2$, pointing to the next spectrum, and so on. Note that although the fixed-format '.DAT' files can exist without a '.VAR' accompanying, the reverse is not true: a '.VAR' file must always have a '.DAT' counterpart, to store the byte offset positions of the variable-length record data.

3.6 Table Types

The following sections describe the different types of CIRS data tables. Field names given are the exact field names which are used when interrogating the database using **Vanilla**. Field names followed by '[']' are variable width fields, i.e. an array, whose number of elements may vary from record to record. Normally, the number of elements in the array for each record is given in the preceding field. Some fields are fixed-width arrays, e.g. 'LATITUDE_ZPD[9]', an array of nine elements. Please see the Vanilla Users Guide document for more information on querying arrays.

3.6.1 OBS tables

These tables store information relating to the instrument data-taking settings for each scan, and also the values of warning or indicator flags.

Fields:

SCET

Spacecraft Event Time, in UT seconds from epoch (01/01/1970). This field is the primary key for all table fragments, and is a required field in all table types. Note that there is a utility `cirs_time` for converting text time to SCET.

By itself, OBS.SCET corresponds to the truncated integer time value of the interferogram's first recorded raw data sample. To get the more accurate floating point value, use `OBS.SCET + OBS.SCET_MSEC / 1000`.

SCLK

Spacecraft clock ticks, approximately from launch. Not guaranteed to exact one-second intervals. SCLK is not used a primary key field because unlike SCET, it cannot be simply converted to UT without the NAIF library routines, and the SCLKSCET kernels.

RTI The length of the scan, in real time interrupts (1/8 second).

FP3_MODE Detectors enabled on FP3. Four possible values: (O)dd, (E)ven, (C)enter or (P)airs.

FP4_MODE Detectors enabled on FP4. Values as for FP3_MODE.

FIR_OVERFLOW Overflow detected during application of FIR numerical filter.

FP1_OVERFLOW Overflow on FP1 average buffer.

FP3_OVERFLOW Overflow on FP3 average buffer.

FP4_OVERFLOW Overflow on FP4 average buffer.

FP1_COMP_OVERFLOW Overflow on compression buffer 1.

FP3_COMP_OVERFLOW Overflow on compression buffer 3.

FP4_COMP_OVERFLOW Overflow on compression buffer 4.

FP3_ZERO Detected 0000H on FP3 raw data (lower limit has been reached and possibly exceeded).

FP3_OFFF Detected 0FFFFH on FP3 raw data (upper limit has been reached and possibly exceeded).

FP1_ZERO Detected 0000H on FP1 raw data (lower limit has been reached and possibly exceeded).

FP1_OFFF Detected 0FFFFH on FP1 raw data (upper limit has been reached and possibly exceeded).

FP4_ZERO Detected 0000H on FP4 raw data (lower limit has been reached and possibly exceeded).

FP4_OFFF Detected 0FFFFH on FP4 raw data (upper limit has been reached and possibly exceeded).

COADD Coadding enabled (=1) or not enabled (=0).

SCIENCE_OVERWRITTEN Science data overwritten condition detected.

FLYBACK_EXCEEDED Flyback exceeded.

SCAN_EXCEEDED Scan exceeded.

MECHANISM_ENABLED Mechanism enabled.

MECH_OUT_OF_PHASE Mechanism out of phase = 1, otherwise 0.

LASER_A_ENABLED Laser A enabled.

LASER_B_ENABLED Laser B enabled.

MECH_CMDED Enable mechanism cmded.

WHITE_OVERRIDE White light override.

OPTICAL_SENSE_MODE Optical sensor (0), decs (1) mode.

SHUTTER Shutter open (0), closed (1).

RIE_LASCMD_LSB RIE: LASCMD_LSB Lamp current select.

RIE_LASCMD_MSB RIE: LASCMD_MSB Lamp current select.

RIE_LASCMD_A RIE: LASCMD_A Lamp A select.

RIE_LASCMD_B RIE: LASCMD_B Lamp B select.

RAW_NO_SET Count of raw samples without set control bits.

RAW_FP1_COUNT Number of FP1 samples read in this scan.

RAW_FP3_COUNT Number of FP3 samples read in this scan.

RAW_FP4_COUNT Number of FP4 samples read in this scan.

FIRST_SAMPLE_RTI RTI value when 1st sample in scan collected.

SCET_MSEC Fractional part of observation SCET.

COMPUTED_RTI Computed number of RTIs during scan.

CONSECUTIVE_NULL_SCANS Number of consecutive scans with 0 raw samples.

IDS_MUX IDS MUX channel number.

TCM_MUX TCM MUX channel number.

PACKETIZATION_STATUS

Describes which of the 5 channels for FP3 and FP4 have been packetized. Bits 0-4 describe FP3 (channels 1-5, respectively); bits 5-9 describe FP4; 0=enabled, 1=disabled.

MSEC_SINCE_RTI Millisec between RTI pulse and flyback signal.

FSV Flight software version ASSUMED IN PROCESSING.

SCAN_FLYBACK_MSEC

Represents the time (in seconds) from the first raw data sample to the start of the mirror flyback. Implemented on board the instrument as of FSV 6.0.1. Before FSV 6.0.1, this field will be set to 0.

3.6.2 FRV tables

This is an averaged measure of the voltages of the central fringe of the CIRS reference interferometer. Eight samples, read back to back with no more than 2 ms between readings, are averaged to obtain the values that are stored in telemetry. The readings are performed approximately once per second during the forward motion of the science scan. The exact timing of the readings is randomized and occurs between 1.0 and 1.3 seconds apart because reading the fringe voltage in exact 1 second intervals results in 1Hz noise being present in the science data. See Kunde *et. al.* (1996) for details of this device.

Fields:

SCET

The Spacecraft Event Time (seconds from epoch). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

NFRV

The number of data points in the fringe voltage record.

FRV

A pointer to the location of the data in the variable length record file.

3.6.3 IFGM tables

These tables store the actual IFM records. Note that there will be eleven IFM records (one per signal channel) for each OBS record.

Each record consists of a fixed-length part and a variable-length part corresponding to the actual IFM, which is stored in a separate file. The header stores the detector number and a pointer to the position of the variable-length data record in the VAR file.

Fields:

SCET

The Spacecraft Event Time (seconds from epoch 1/1/1970 neglecting leap seconds). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

DET

The number of the detector which recorded the IFM (see table 1).

NPTS

The number of data points in the interferogram.

IFGM

A pointer to the location of the IFM in the variable length record file.

3.6.4 HSK tables

These tables store the data from the housekeeping packets, including temperature information which is required for the calibration of IFMs. Note that the housekeeping packets are created every 64 seconds, and records do not have a direct one-to-one or one-to-many correspondence to science scans, as all other table records do.

Fields:

SCET Spacecraft event time of this record.

IDSSTAT0 IDS system status word 0.

IDSSTAT1 IDS system status word 1.

IDSSTAT2 IDS system status word 2.

IDSERR0 IDS error status word 0.

IDSERR1 IDS error status word 1.

IDSERR2 IDS error status word 2.

IDSERR3 IDS error status word 3.

IDSERR4 IDS error status word 4.

IDSERR5 IDS error status word 5.

IDSERR6 IDS error status word 6.

IDSERR7 IDS error status word 7.

PCASTAT PCA status echo word.

SMERIESTAT SME/RIE status echo word.

FP3LASTCMD FP3 last command.

FP4LASTCMD FP4 last command.

TCMLASTCMD TCM last command.

IDSCMDREC IDS command packets received count.

IDSCMDexe IDS command packets executed count.

IDSCMDREJ IDS command packets rejected count.

FP1MAX FP1 maximum raw sample.

FP3MAX FP3 maximum raw sample.

FP4MAX FP4 maximum raw sample.

FRINGEMAX Fringe maximum voltage.

FRINGEMIN Fringe minimum voltage.

PENDINGTTAG Number of pending time tagged commands.

CODECHK Code checksum.

REJECTOP Last command rejected opcode.

CMDSEQTAB Loaded command sequence table number playback.

PCA_ATEM PCA ‘A’ board temperature.

PCA_BTEM PCA ‘B’ board temperature.

PCA_CTEM PCA ‘C’ board temperature.

SME_ATEM SME ‘A’ board temperature.

SME_BTEM SME ‘B’ board temperature.

RIE_ATEM RIE ‘A’ board temperature.

FEE_ATEM FEE ‘A’ board temperature.

FEE_BTEM FEE ‘B’ board temperature.

FEE_CTEM FEE ‘C’ board temperature.

FEE_DTEM FEE ‘D’ board temperature.

TCM_ATEM TCM ‘A’ board temperature.

TCM_BTEM TCM ‘B’ board temperature.

SCIPKTMUX Science packet MUX information (pre-sleep).

PROCESSORTEM Processor board temperature.

BIUTEM Bus Interface Unit (BIU) board temperature.

ADCTEM Analog to digital converter (ADC) board temperature.

MOTORCURRENT Scan motor current.

DECSPOSN DECS postion.

VELERR Velocity percentage error.

PHASEERR Phase error.

TRANSME Commanded SME settings (pre-sleep).

TRANRIE Commanded RIE settings (pre-sleep).

FRINGEV Fringe voltage.

RIESMEPOS12V RIE/SME positive 12V.

RIESMENEG12V RIE/SME negative 12V.

RIESMEPOS5V RIE/SME positive 5V.

LASERCURRENT Laser current.

LEDCURRENT LED current.

MUXREADERR MUX reading error information (pre-sleep).

IDSP0S15V IDS positive 15 volts.

IDSNEG15V IDS negative 15 volts

IDSP0S5V IDS positive 5 volts.

TABLELOADCHK Table load memory checksum (pre-sleep).

FPACOEFF Focal plane coefficients checksum (pre-sleep).

SCIREJ Count of raw samples thrown out because of the sampling rules (pre-sleep).

PHOTODIODE Photodiode monitor.

HTR80KCURR 80K heater current.

HTROP_ACURR Optics assembly heater current.

HTRP_MRCURR Primary mirror heater current.

HTRS_MRCURR Secondary mirror heater current.

TCMREF TCM reference.

HSECOOLTEM Housing temperature at cooler interface near Ge lens.

FIRPOLRIZTEM Far-IR (FIR) inout polarizer temperature.

FP1DETTEM FP1 detector temperature.

MECHHSETEM Scan mechanism housing temperature.

SECMIRRTEM Secondary mirror back side temperature.

PRIMIRRTEM Primary mirror back side edge temperature.

SECMIRBAFFTEM Secondary mirror baffle back side temperature.

PMSUNSHDMLITEM Primary mirror MLI side sun-shade temperature.

PMSUNSHDRADTEM Primary mirror radiator side sun-shade temperature.

CONERIMTEM Cone rim temperature.

FPATEM Focal Plane Assembly (FPA) temperature.

PATCHCENTEM Patch center temperature.

THERMISTORDRV Thermistor drive.

IDSCALIB IDS Calibration.

LATERTI Late/missing RTI count, bad scan count, reused MUX values (pre-sleep).

IDSNEG5V IDE negative 5 volts.

IDSCALIB2 MUX 58 (pre-sleep IDS calibration, previously not sampled).

SCANLEN Current scan settings, BIU watchdog induced re-initializations (pre-sleep).

BIUERRINFO BIU descriptor table error information (pre-sleep).

3.6.5 IHSK tables

These tables store interpolated housekeeping data. Selected quantities from the HSK house-keeping tables are interpolated to the times of the actual scans, for use in calibration.

Fields:

SCET Spacecraft Event Time (UT) (seconds from 1/1/70). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

HSECOOLTEM Scan mechanism housing cooler temperature.

FIRPOLRIZTEM Temperature of the FIR polarizer.

ZINSTRADTEM Z-axis instrument radiator temperature.

FP1DETTEM Temperature of the FP1 detector.

MECHHSETEM Scan mechanism housing temperature.

SECMIRRTEM Temperature of the secondary mirror.

PRIMIRRTEM Temperature of the primary mirror.

SECMIRBAFFTEM Temperature of the secondary mirror baffle.

PMSUNSHDMLITEM Temperature of the primary mirror sunshade MLI.

PMSUNSHDRADTEM Temperature of the primary mirror sunshade radiator.

FPATEM Temperature of the MIR focal plane assembly.

3.6.6 DIAG tables

These tables contain diagnostic information determined regarding the raw interferograms, including the presence or absence of noise interferences.

Fields:

SCET

The Spacecraft Event Time (seconds from epoch 1/1/1970 neglecting leap seconds). corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

DET

The number of the detector which recorded the IFM (see table 1).

BIURTI

RTI offset of 0.5 Hz BIU interference.

NOISE

Noise status identification (performed independently of any onboard detection). Bits are set as below with a value of 1 indicating the listed condition:

1	Normal: Scan Mechanism Either In Phase or Out of Phase (MECH_OUT_OF_PHASE = 0 or 1)
2	Invalid time stamp
4	Shutter opening or closing
8	Insufficient samples
16	Short NPTS
32	Long NPTS: 38 RTI Interferograms Only
64	Incorrect ZPD position
128	Big spikes
256	Average interferogram
512	Standard Deviation
640	Standard Deviation Plus Big Spikes
1024	DC level
2048	Drift
2560	Standard Deviation Plus Drift
4096	Velocity Variations: Scan Mechanism In Phase (MECH_OUT_OF_PHASE = 0)
5555	FP1 deep-space IFGMs are assigned NOISE = 5555 if SPECTRUM_DIAGNOSTIC = 2, 3 or 4
6666	All FP1 IFGMs (target and deep-space) are assigned NOISE = 6666 if SPECTRUM_DIAGNOSTIC >= 5
7777	FP1, FP3 and FP4 shutter-closed IFGMs whose rawpowers are not within the established minima and maxima are assigned NOISE = 7777

8192 Velocity Variations: Scan Mechanism Out of Phase
(MECH_OUT_OF_PHASE = 1)
8888 FP1, FP3 and FP4 deep-space IFGMs whose rawpowers are not within
the established minima and maxima are assigned NOISE = 8888

DSCAL

Set to 1 for DSCAL and 0 for no DSCAL. This identifies whether a given IFM occurs inside a DSCAL request, or not. DSCAL requests are dedicated observations of deep space for calibration purposes. Note however that space IFMs may occur in other request types.

LASER

Frequency mode at which the laser was operating at a particular time. The mode, reason for the mode change, start/end SCET, and start/end dates are given below:

Laser 2: (Sleep mode.)
1073961603 to 1077993707
(DOY 13) Tue Jan 13 02:40:03 2004 to (DOY 59) Sat Feb 28 18:41:47 2004

Laser 1: (Sleep mode.)
1078530603 to 1079769196
(DOY 65) Fri Mar 5 23:50:03 2004 to (DOY 80) Sat Mar 20 07:53:16 2004

Laser 3: (Sleep mode.)
1079833084 to 1087948799
(DOY 081) Sun Mar 21 01:38:04 2004 to (DOY 174) Tue Jun 22 23:59:59 2004

Laser 0: (Sleep mode. No data for 1087948800 to 1088650799)
1088650800 to 1088651999
(DOY 183) Thu Jul 01 03:00:00 2004 to (DOY 183) Thu Jul 01 03:19:59 2004

Laser 3: (After sleep mode recovery.)
1088652000 to 1095585204
(DOY 183) Thu Jul 1 03:20:00 2004 to (DOY 263) Sun Sep 19 09:13:24 2004

Laser 1: (Sleep mode on Sep 14, 2004.)
1095624963 to 1098725324
(DOY 263) Sun Sep 19 20:16:03 2004 to (DOY 299) Mon Oct 25 17:28:44 2004

Laser 0: (Commanding error triggered FSW buffer overflow.)
1098725325 to 1098931144
(DOY 299) Mon Oct 25 17:28:45 2004 to (DOY 302) Thu Oct 28 02:39:04 2004

DIAG

Laser 3: (New mode after FSW buffer overflow.)
1098931145 to 1103187466
(DOY 302) Thu Oct 28 02:39:05 2004 to (DOY 351) Thu Dec 16 08:57:46 2004

Laser 2: (Sleep mode.)
 1104457984 to 1104983928
 (DOY 366) Fri Dec 31 01:53:04 2004 to (DOY 6) Thu Jan 6 03:58:48 2005

Laser 1: (Power off/on.)
 1105811223 to 1129193320
 (DOY 15) Sat Jan 15 17:47:03 2005 to (DOY 286) Thu Oct 13 08:48:40 2005

Laser 0: (FSW 4.0 checkout. No data between 1129193320 and 1129286231.)
 1129286231 to 1129824000
 (DOY 287) Fri Oct 14 10:37:11 2005 to (DOY 293) Thu Oct 20 16:00:00 2005

Laser 2: (New laser mode after FSW 4.0 checkout. No data between
 1129824000 1130030764.)
 1130030764 to 1165726252
 (DOY 296) Sun Oct 23 01:26:04 2005 to (DOY 344) Sun Dec 10 04:50:52 2006

Laser 0: (2 BIU Anomalies. Any data between anomalies is being set to
 laser mode 0.)
 1165726253 to 1166349840
 (DOY 344) Sun Dec 10 04:50:53 2006 to (DOY 351) Sun Dec 17 10:04:00 2006

Laser 1: (New laser mode after BIU anomalies.)
 1166349841 to 1175091184
 (DOY 351) Sun Dec 17 10:04:01 2006 to (DOY 87) Wed Mar 28 14:13:04 2007

Laser 0: (FSW 5.0.0 Checkout and RWA tests.)
 1175091185 to 1175749449
 (DOY 87) Wed Mar 28 14:13:05 2007 to (DOY 95) Thu Apr 5 05:04:09 2007

Laser 3: (New laser mode after FSW 5.0.0 checkout and RWA tests.)
 1175749450 to 1179617676
 (DOY 95) Thu Apr 5 05:04:10 2007 to (DOY 139) Sat May 19 23:34:36 2007

Laser 1: (BIU Anomaly at 1179617852. No data between 1179617676 and
 1179721622.)
 1179721622 to 1189479538
 (DOY 141) Mon May 21 04:27:02 2007 to (DOY 254) Tue Sep 11 02:58:58 2007

Laser 2: (TWTA Anomaly at 1189489715. No data between 1189479538 and
 1189979462.)
 1189979462 to 1191666950
 (DOY 259) Sun Sep 16 21:51:02 2007 to (DOY 279) Sat Oct 6 10:35:50 2007
 DIAG

Laser 3: (CDS checkout testing.)
 1192741682 to 1213985272
 (DOY 291) Thu Oct 18 21:08:02 2007 to (DOY 172) Fri Jun 20 18:07:52 2008

Laser 0: (FSW 5.0.3 and Noise Tests. Data between 1213988100-1214013237 is considered suspect due to both FSW and noise tests during those times.)
1213988100 to 1214013237

(DOY 172) Fri Jun 20 18:55:00 2008 to (DOY 173) Sat Jun 21 01:53:57 2008

Laser 3: (New laser mode after FSW 5.0.3 and Noise tests.)

1214013265 to 1225618557

(DOY 173) Sat Jun 21 01:54:25 2008 to (DOY 307) Sun Nov 2 09:35:57 2008

Laser 0: (BIU Anomaly at 1225618562. Any data between 1225618557 and the time of the first packet after recovery, 1225820038, will be set to laser mode 0.)

1225618562 to 1225820037

(DOY 307) Sun Nov 2 09:36:02 2008 to (DOY 309) Tue Nov 4 17:33:57 2008

Laser 1: (New Laser mode after BIU anomaly.)

1225820038 to 1263909833

(DOY 309) Tue Nov 4 17:33:58 2008 to (DOY 19) Tue Jan 19 14:03:53 2010

Laser 0: (FSW 6.0 Noise test. There is no data between 1263909833 and 1263943802.)

1263943802 to 1264059137

(DOY 19) Tue Jan 19 23:30:02 2010 to (DOY 21) Thu Jan 21 07:32:17 2010

Laser 1: (Laser mode after FSW 6 Noise test.)

1264059138 to 1266696408

(DOY 21) Thu Jan 21 07:32:18 2010 to (DOY 51) Sat Feb 20 20:06:48 2010

Laser 0: (FSW 6.0 Noise test. There is no data between 1266696408 and 1266701700.)

1266701700 to 1266814125

(DOY 51) Sat Feb 20 21:35:00 2010 to (DOY 53) Mon Feb 22 04:48:45 2010

Laser 1: (Laser mode after FSW 6 Noise test.)

1266814126 to 1280319412

(DOY 53) Mon Feb 22 04:48:46 2010 to (DOY 209) Wed Jul 28 12:16:52 2010

Laser 0: (FSW 6.0 Install. All data between 1280319412 and 1280329999 will be set to laser mode 0 because the laser recovery period makes the data suspect.)

1280319413 to 1280329999

(DOY 209) Wed Jul 28 12:16:53 2010 to (DOY 209) Wed Jul 28 15:13:19 2010

Laser 3: (New laser mode after FSW 6.0 install.)

1280330000 to 1288733305

(DOY 209) Wed Jul 28 15:13:20 2010 to (DOY 306) Tue Nov 2 21:28:25 2010

Laser 0: (CDS anomaly. All data until 1291068454 will be set to laser

mode 0 because the laser time recovery period makes the data suspect.)
1289849995 to 1291068454
(DOY 319) Mon Nov 15 19:39:55 2010 to (DOY 333) Mon Nov 29 22:07:34 2010

Laser 3: (Laser mode after anomaly.)
1291068459 to 1349883853
(DOY 333) Mon Nov 29 22:07:39 2010 to (DOY 284) Oct 10 15:44:13 2012

Laser 0: (Recovery period after BIU Anomaly.)
1349883854 to 1350056586
(DOY 284) Oct 10 15:44:14 2012 to (DOY 286) Oct 12 15:43:06 2012

Laser 1: (Laser Mode After recovery Period from BIU Anomaly.)
1350056587 to 1350632538
(DOY 286) Oct 12 15:43:07 2012 to (DOY 293) Oct 19 07:42:18 2012

Laser 0: (After Turn off for a Propellant Test. Data until 1350635994
will be set to mode 0 due to laser time recovery making data suspect.)
1350632539 to 1350635994
(DOY 293) Oct 19 07:42:19 2012 to (DOY 293) Oct 19 08:39:54 2012

Laser 1: (Laser after Propellant Test.)
1350635995 to 1365643133
(DOY 293) Oct 19 08:39:55 2012 to (DOY 101) Apr 11 01:18:53 2013

Laser 5: (New mode after BIU Anomaly and during laser recovery
period.)
1365672959 to 1398902399
(DOY 101) Apr 11 09:35:59 2013 to (DOY 120) Apr 30 23:59:59 2014

Laser 3: (Laser after Recovery Period from BIU Anomaly.)
1398902400 to 1402556755
May 1 00:00:00 2014 to (DOY 163) Jun 12 07:05:55 2014

Laser 6: (New mode after FSW 7.)
1402556756 to Present
(DOY 163) Thu Jun 12 07:05:56 2014 to present

LASER A MODE 6
(DOY 163) Jun 12 07:05:56 2014 to (DOY 234) Aug 22 10:35:33 2017

LASER B (cannot be calibrated yet)
(DOY 234) Aug 22 10:35:34 2017 to (DOY 235) Aug 23 19:08:50 2017

LASER A MODE 5
(DOY 235) Aug 23 19:09:48 2017 to EOM

WN8HZSPIKE Wavenumber of FP1 8 Hz spike.

FWHM8HZSPIKE FWHM in cm-1 of FP1 8 Hz spike.

WNSINE Wavenumber of FP1 sine wave.

FWHMSINE FWHM in cm-1 of FP1 sine wave.

PHASESINE Phase of FP1 Sine Wave (radians).

RATIO_FWHM_HALF_HZ Ratio of FP1 0.5 Hz Spike FWHMs.

RATIO_WN_EIGHT_HZ Ratio of FP1 8 Hz Spike WNs.

RATIO_FWHM_EIGHT_HZ Ratio of FP1 8 Hz Spike FWHMs.

RAWPOWER Power in uncalibrated FFT.

RATIO_EIGHT_HZ_SPIKE_AMPLITUDE Ratio of FP1 8 Hz spike power spectrum amplitude after/before spike suppression.

DELTA_BIURTI BIURTI-Offset difference between the two inteferograms in a coadded pair.

FIFM_STD_DEV Standard deviation of flat region of filtered interferogram.

SPECTRUM_DIAGNOSTIC

Description of success of the FP1 de-spiking:

SPECTRUM_DIAGNOSTIC = 0:

BIURTI_Offset = 0 - 15 and 22:

- (1) The cross correlation between the 0.5 Hz deep-space waveform ("comb") and the 0.5 Hz spikes in the interferogram was found.
- (2) The interferogram was successfully de-spiked by the de-spike algorithm.

SPECTRUM_DIAGNOSTIC = 1:

BIURTI_Offset = 0 - 15 and 22:

- (1) The de-spike algorithm found sufficient 0.5 Hz spikes in both the first and second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs.
- (2) Delta_0p5_Hz_BIURTI_Offset != +/- 1.

SPECTRUM_DIAGNOSTIC = 2:

BIURTI_Offset = 0 - 15 and 22:

- (1) The de-spike algorithm could not find sufficient 0.5 Hz spikes in either the first or second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs.
- (2) Delta_0p5_Hz_BIURTI_Offset = +/- 1.

SPECTRUM_DIAGNOSTIC = 3:

BIURTI_Offset = 0 - 15 and 22:

- (1) The de-spike algorithm could not find sufficient 0.5 Hz spikes in either the first or second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs.
- (2) Delta_0p5_Hz_BIURTI_Offset != +/- 1.

SPECTRUM_DIAGNOSTIC = 4:

The FP1 8 Hz spike is marginally suppressed:

Amplitude_8_Hz_Spike_After_Spike_Suppression/
Amplitude_8_Hz_Spike
> Ratio_8_Hz_Spike_Amplitude_Min
Amplitude_8_Hz_Spike_After_Spike_Suppression/
Amplitude_8_Hz_Spike < Ratio_8_Hz_Spike_Amplitude_Max

SPECTRUM_DIAGNOSTIC = 5:

The FP1 8 Hz spike is not sufficiently suppressed:

Amplitude_8_Hz_Spike_After_Spike_Suppression/
Amplitude_8_Hz_Spike >= Ratio_8_Hz_Spike_Amplitude_Max

SPECTRUM_DIAGNOSTIC = 6:

The FP1 sine wave could not be detected

SPECTRUM_DIAGNOSTIC = 7:

BIURTI_Offset = 66:

No cross correlation between the 0.5 Hz deep-space waveform ("comb") and the 0.5 Hz spikes in the interferogram could be found.

SPECTRUM_DIAGNOSTIC = 8:

BIURTI_Offset = 77, 88, or 99:

The de-spike algorithm could not find sufficient 0.5 Hz spikes in the interferogram that match the 0.5 Hz spikes in the shifted 0.5 Hz comb.

TZPD The ZPD region is modeled as a sine-wave-burst (a sine-wave with slowly decaying amplitude (i.e., the envelope) as you move away from the ZPD). TZPD is the position of the peak with the greatest amplitude within the sine-wave-burst.

TAMP Amplitude of the interferogram at TZPD.

ZPDENV Position of the peak within the sine-wave-burst envelope.

AMPENV Amplitude of the interferogram at ZPDENV.

IFM_DCLEVEL Interferogram DC level for FP1, FP3, and FP4.

STD_DEV_BEFORE_ZPD Standard Deviation before ZPD region.

STD_DEV_ZPD_REGION Standard Deviation in ZPD region.

STD_DEV_AFTER_ZPD Standard Deviation after ZPD region.

RWA1_MIN Minimum RWA 1 rate during this IFM.

RWA1_MAX Maximum RWA 1 rate during this IFM.

RWA2_MIN Minimum RWA 2 rate during this IFM.

RWA2_MAX Maximum RWA 2 rate during this IFM.

RWA3_MIN Minimum RWA 3 rate during this IFM.

RWA3_MAX Maximum RWA 3 rate during this IFM.

RWA4_MIN Minimum RWA 4 rate during this IFM.

RWA4_MAX Maximum RWA 4 rate during this IFM.

RWA_NOISE_FLAG 1 if there is a high probability that this IFM has been adversely affected by one of the wheel rates.

DELTA_RTI_DIFFERENCE Error between where the FIFM spike pattern is predicted to be located and where it actually is calculated to be located.

NOISE_DIAGNOSTIC Additional noise values for each interferogram for diagnostic purposes:

0 - Normal scan.

5555 - FP1 deep-space IFGMs are assigned NOISE_DIAGNOSTIC = 5555 if SPECTRUM_DIAGNOSTIC = 2, 3 or 4.

6666 - All FP1 IFGMs (target and deep-space) are assigned NOISE_DIAGNOSTIC = 6666 if SPECTRUM_DIAGNOSTIC >= 5.

7777 - FP1, FP3, and FP4 shutter-closed IFGMs whose rawpowers are not within the established minima and maxima are assigned NOISE_DIAGNOSTIC = 7777.

8888 - FP1, FP3 and FP4 deep-space IFGMs whose rawpowers are not within the established minima and maxima are assigned NOISE_DIAGNOSTIC = 8888.

AMPSINEWAVE Amplitude in inverse counts of the FP1 sine wave.

AMP8HZSPIKE Amplitude in inverse counts of the FP1 8 Hz spike.

3.6.7 GEO tables

These tables store the ‘geometry’, the relative positions and orientations of the spacecraft, primary body, and object bodies (which may include the primary, e.g. Saturn), usually at

the time of the zero path difference (ZPD) of the interferogram (when most of the signal is collected). One entry is generated for every body in the target list.

Fields:

SCET

The SCET of the beginning of a scan is stored as an integer containing “Unix time”, the whole number of seconds past January 1, 1970 UT, *neglecting leap seconds*. This means that for every leap second added (subtracted) the “zero of time” actually shifts forward (backward) with respect to UT. This is ordinarily not a problem, but has to be taken into account when converting SCET to ephemeris time.

SCET corresponds to the truncated integer time value of the interferogram’s first recorded raw data sample.

SCLK

The spacecraft clock time.

PARTITION

The partition number of the SCLK. See the NAIF toolkit documentation for a description of SCLK partitions.

TIME_ZPD

The time of the ZPD based on SCET, SCET_MSEC, TZPD, and the sampling rate. This is also a “Unix time”.

BODY_ID

The NAIF id of the body, for example, 699 (Saturn).

EPHEMERIS.TIME

The ephemeris time used to obtain the following entries from the SP kernels. This ephemeris time is computed from TIME_ZPD.

BODY_SPACECRAFT_RANGE

The distance from the center of the body to the spacecraft, in km.

BODY_POSITION

The Cartesian coordinates of the body as seen from the spacecraft, in km, in the J2000 coordinate system. This is computed at the EPHEMERIS.TIME.

BODY_SUB_SPACECRAFT_LONGITUDE

The planetographic sub-spacecraft longitude at SCET, in degrees west, in the IAU coordinate system defined for the body. The body can be Saturn or Jupiter or one of their satellites. The NAIF ellipsoid for the surface of the body is used to determine the sub-spacecraft point. For Saturn and Jupiter, this is the ellipsoid defining the 1-bar level, for the satellites, including Titan, their surfaces. The longitude is that of the point nearest to the spacecraft on the NAIF ellipsoid.

BODY_SUB_SPACECRAFT_LATITUDE

The planetographic sub-spacecraft latitude, in degrees north. The latitude is that of the point nearest to the spacecraft on the NAIF ellipsoid.

BODY_SUN_RANGE

The distance from the Sun to the body, in km. This is computed at the **EPHEMERIS_TIME** minus one light travel time from the spacecraft to the body.

BODY_SUN_RIGHT_ASCENSION

The right ascension of the Sun as seen from the body, in degrees, in the J2000 coordinate system.

BODY_SUN_DECLINATION

The declination of the Sun as seen from the body, in degrees, in the J2000 coordinate system.

BODY_SUB_SOLAR_LONGITUDE

The longitude, in degrees west, of the sub-solar point on the body.

BODY_SUB_SOLAR_LATITUDE

The planetographic latitude, in degrees north, of the sub-solar point on the body.

BODY_PHASE_ANGLE

The angle in degrees between the radial vector of the spacecraft and the radial vector of the Sun, from the center of the body.

BODY_ANGULAR_SEMIDIAMETER

The equatorial angular radius of the body as seen by the spacecraft, in milliradians.

BODY_ORBITAL_LONGITUDE

The longitude of the body, in degrees, as measured from the anti-solar point on the primary. If the body and primary are the same body, this is set to -200.

BODY_SYS3_LONGITUDE

The longitude of the body in the primary's body fixed IAU coordinate system. If the body is the primary, this is set to -200.

PRIMARY_ID

The NAIF id of the primary. This will be the same as **BODY_ID** if the primary is the body.

PRIMARY_SPACECRAFT_RANGE

The distance from the primary to the spacecraft, in km.

PRIMARY_SUB_SPACECRAFT_LONGITUDE

The planetographic sub-spacecraft longitude, in degrees west, in the IAU coordinate system defined for the primary. The NAIF ellipsoid for the primary of the body is used to determine the sub-spacecraft point. For Saturn or Jupiter, this is the ellipsoid defining the 1-bar level.

PRIMARY_SUB_SPACECRAFT_LATITUDE

The planetographic primary sub-spacecraft latitude, in degrees north.

PRIMARY_SUN_RANGE

The distance from the Sun to the primary, in km.

PRIMARY_SUB_SOLAR_LONGITUDE

The longitude, in degrees west, of the sub-solar point on the primary.

PRIMARY_SUB_SOLAR_LATITUDE

The planetographic latitude, in degrees north, of the sub-solar point on the primary.

PRIMARY_PHASE_ANGLE

The angle in degrees between the radial vector of the spacecraft and the radial vector of the Sun, from the center of the primary.

PRIMARY_ANGULAR_SEMIDIAMETER

The equatorial angular radius of the primary as seen by the spacecraft, in milliradians.

SCET_STRING

The SCET in a human readable string form in ISO format. For example, an SCET of 1091318406 corresponds to an SCET_STRING of “2004-214T00:00:06”.

BODY_SUB_SPACECRAFT_LATITUDE_PC

The planetocentric sub-spacecraft latitude, in degrees north.

BODY_SUB_SOLAR_LATITUDE_PC

The planetocentric sub-solar latitude, in degrees north.

PRIMARY_SUB_SPACECRAFT_LATITUDE_PC

The planetocentric primary sub-spacecraft latitude, in degrees north.

PRIMARY_SUB_SOLAR_LATITUDE_PC

The planetocentric primary sub-solar latitude, in degrees north.

3.6.8 POI tables

These tables store the pointing for each active detector at the ZPD of the IFM. One POI entry is generated for each detector and each non-rings non-primary target in the field of view. An entry is always generated for the primary as the target, whether or not it is in the field of view. Rings are described in a separate RIN table rather than as entries in the POI tables.

Some of the values are stored as array[9]. For these quantities, not only are the values at field of view center stored, but at other locations of the projected field of view as well, known as *Q points*. For FP1, the *Q points* are each of the eight cardinal compass points around

the edge of the circular FOV are used. For the square mid-IR detectors, the corners of the FOV and midpoints on the lines connecting the corners are used (see Figure 4). Q point 5 is always the boresight of the detector. The NAIF routine **getfov_c** is used to get the vectors corresponding to the Q points. All values, unless otherwise noted, are computed at TIME_ZPD.

Fields:

TARGET_ID

The NAIF id of the target. See table 3.

PRIMARY_ID

The NAIF id of the primary. This may be the same as TARGET_ID.

SCET

Spacecraft Event Time (UT) (seconds from 1/1/70). Corresponds to the truncated integer time value of the interferogram’s first recorded raw data sample.

TIME_ZPD

The time of the ZPD based on SCET, SCET_MSEC, TZPD, and the sampling rate. This is also a “Unix time”.

TIME_END

The time of the end of the scan.

DET

The detector id. See Table 1.

ALL_Q_ON

A boolean argument, 1 if all 9 Q points for a given detector hit the target. If one or more miss, it’s 0.

LATITUDE_ZPD

This array of nine values, in degrees north, gives the planetographic latitude of the “ray periapsis” for each of the individual Q points of a particular detector at TIME_ZPD. If the Q point is on the target, then this is the latitude of the intersection of the ray with the “surface”. Otherwise, it is the latitude of the point on the ray closest to the surface.

LONGITUDE_ZPD

The array containing the longitudes, in degrees west, of the ray periapses for the Q points.

ALTITUDE_ZPD

The array containing the altitudes of the ray periapses for the Q points at TIME_ZPD. If a Q point is on target, this is zero. Otherwise, it’s the altitude of the ray periapsis in km.

RIGHT ASCENSION

An array containing the right ascension towards which each of the Q points is pointing, in degrees, in the J2000 coordinate system at TIME_ZPD.

DECLINATION

An array containing the declination towards which each of the Q points pointing, in degrees, in the J2000 coordinate system at TIME_ZPD.

SPACECRAFT_TO_IMAGE_POINT_ZPD

The distance along the Q points to either the “surface” of the target or the ray periapsis, in km.

LATITUDE_END

The planetographic latitude, at TIME_END, of the boresight (Q point 5) ray periapsis or intersection point on the target, in degrees north.

LONGITUDE_END

The longitude, at TIME_END, of the boresight (Q point 5) ray periapsis or intersection point on the target, in degrees west.

ALTITUDE_END

The altitude, at TIME_END, of the boresight (Q point 5). If the boresight is on target, this is zero. Otherwise, it’s the altitude of the ray periapsis in km.

SMEAR

The SMEAR is defined in the following manner. The position of the boresight on the target at TIME_ZPD is computed and saved. Then, at TIME_END, the angle between that point and the position of the boresight at TIME_END is computed. SMEAR is the ratio of this angle with the angular width of the field of view of the detector, or in other words, is the fraction of the field of view that the original intersection point of the boresight has moved between TIME_ZPD and TIME_END. If the boresight doesn’t hit the target, the ray periapsis rather than the intersection point will be used to calculate SMEAR.

EMISSION_ANGLE

This array contains the angle in degrees between the normal at the point on the surface at which the Q point intersects and the spacecraft direction vector, in degrees. If the Q point doesn’t intersect the surface, this is set to 90 degrees.

EMISSION_ANGLE_FOV_AVERAGE

This is an average of the values of the emission angle over the field of view. It is currently computed using a Monte Carlo integration with 1000 points randomly distributed in the field of view. If a given point is off the target, it is rejected and a new one is tried. If the target isn’t in the field of view, or more than 80% of the points attempted are off the target this is set to -200.

FILLING_FACTOR

This contains the fraction of the FOV filled by the target (between 0.0 and 1.0), computed during the same Monte Carlo integration as `EMISSION_ANGLE_FOV_AVERAGE`. For FP3 and FP4 this is the geometric filling factor, since their response functions are uniform. For FP1, the response function is approximately a gaussian (the full width at half maximum used is 2.42 mrad), and this is used in the computation of `EMISSION_ANGLE_FOV_AVERAGE` to select points preferentially towards the center of the detector where it is more sensitive. This means that `FILLING_FACTOR` is not geometric, but instead the center of the detector is given more weight than the edges.

EMISSION_AZIMUTH_ANGLE

This is the projection of the spacecraft position vector on the surface of the target and north, in degrees, for the boresight only. This projection is done for the ray periapsis if the boresight doesn't hit the surface, and so `ALTITUDE_ZPD[4]` should be checked to see if this contains a useful value.

SOLAR_ZENITH

The angle, for each Q point, between the direction vector of the Sun and the normal to the surface at point at which the Q point intersects the surface, in degrees.

SOLAR_AZIMUTH

The angle, for the boresight only, between the projection of the direction vector of the Sun and north on the surface of the target, in degrees.

SOLAR_PHASE

The angle, for the boresight only, between the Sun and the boresight at the point at which the boresight intersects the target, in degrees. If the boresight is off the target, this will be inaccurate.

LOCAL_TIME

The local solar time for each Q point is encoded as

$$\text{LOCAL_TIME} = 100 \times \text{hour} + \text{min} + \text{sec}/100 \quad (1)$$

If the Q point doesn't intersect the surface, this is the local time of the ray periapsis, and so is probably of limited usefulness.

ZLIMB

The angle between the instrument's +Y axis (see Figure 4, NAIF co-ordinates) and the surface normal, in degrees.

SPACECRAFT_BODY_FIXED

Spacecraft location with respect to the body-fixed coordinate system.

FOV_BODY_FIXED

Q-point unit vectors with respect to the body-fixed coordinate system.

Z

Velocity along the line of sight divided by the the speed of light.

LATITUDE_ZPD_PC

This array of nine values, in degrees north, gives the planetocentric latitude of the “ray periapsis” for each of the individual Q points of a particular detector at `TIME_ZPD`. If the Q point is on the target, then this is the latitude of the intersection of the ray with the “surface”. Otherwise, it is the latitude of the point on the ray closest to the surface.

LATITUDE_END_PC

The planetocentric latitude, at `TIME_END`, of the boresight (Q point 5) ray periapsis or intersection point on the target, in degrees north.

NAIF ID	BODY	NAIF ID	BODY
599	Jupiter	699	Saturn
501	Io	601	Mimas
502	Europa	602	Enceladus
503	Ganymede	603	Tethys
504	Callisto	604	Dione
505	Amalthea	605	Rhea
506	Himalia	606	Titan
507	Elara	607	Hyperion
508	Pasiphae	608	Iapetus
509	Sinope	609	Phoebe
510	Lysithea	610	Janus
511	Carme	611	Epimetheus
512	Ananke	612	Helene
513	Leda	613	Telesto
514	Thebe	614	Calypso
515	Adrastea	615	Atlas
516	Metis	616	Prometheus
		617	Pandora
		618	Pan

Table 3: Selected NAIF IDS of relevance to Cassini CIRS.

3.6.9 RIN tables

One entry is generated for each detector at all times. For the purpose of this table, the rings are assumed to fill the equatorial plane of the primary ($z = 0$ in the coordinate system of the primary with z along the rotation axis) out to a selected cutoff radius. If a line of sight intersects the primary body before intersecting the rings, or if the line of sight falls outside the cutoff radius, the values for most fields for that line of sight are set to -200. For a description of the cutoff radius, see the `FOV_TARGETS` field in the `TAR` tables section.

As for the `POI` table, many entries in the `RIN` tables are array[9]. These contain individual entries for the Q points, as discussed above.

Fields:

PRIMARY_ID

The NAIF id of the primary.

SCET

Spacecraft Event Time (UT) (seconds from 1/1/70). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

TIME_ZPD

The time of the ZPD based on SCET, SCET_MSEC, TZPD, and the sampling rate. This is also a "Unix time".

TIME_END

The time of the end of the scan.

DET

The detector ID.

RING_RADIUS_ZPD

An array containing the radius, in km, at which each Q point intercepts the equatorial plane of the primary. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_SPACECRAFT_RANGE_ZPD

An array containing the distance, in km, from the spacecraft to the intercepts of the Q points on the equatorial plane. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_EMISSION_AZIMUTH_ANGLE

This array contains the angles, in degrees, between the Q point vectors projected into the ring plane and the outward radial away from the primary's center. The Q point vectors are vectors along the Q point directions from the focal point of the instrument (center of the focal plane) to the ring plane. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_SOLAR_PHASE

The angle, in degrees, between the Sun's position vector and the Q point's line of sight vectors. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_EMISSION_ANGLE

An array containing the angles in degrees between lines of sight of the Q points and the rotation axis of the primary, which is assumed to be normal to the ring plane. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_LONGITUDE_ZPD

This array of Q points conforms to the PDS standard definition of a longitude on a ring. Longitudes are measured eastwards in an inertial frame from the "ascending node of the intersection of the ring plane with J2000". Entries here are in degrees. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_SOLAR_AZIMUTH

This is the angle, in degrees, between the Sun’s position vector projected into the ring plane and the outward radial from the center of the primary. This is computed for the boresight (Q point 5) only. Set to -200 if the ray falls outside the rings or the primary is in front of the rings. The angle increases counterclockwise when viewed from above the ring plane.

RING_SOLAR_ZENITH

The angle, in degrees, between the Sun’s position vector and the rotation axis of the primary at the intercept point for each of the Q points. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_LONGITUDE_END

The longitude, in degrees, for the boresight only, at `TIME_END`. This is also measured eastwards in an inertial frame from the “ascending node of the intersection of the ring plane with J2000”. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_RADIUS_END

The radius, in km, for the boresight of its intercept with the ring plane at `TIME_END`. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_SPACECRAFT_RANGE_END

The distance, in km, from the spacecraft to the ring plane intercept point of the boresight at `TIME_END`. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_SMEAR

This is computed much like `smear` in the pointing tables. The position of the boresight on the ring plane at `TIME_ZPD` is computed and saved. Then, at `TIME_END`, the angle between that point and the position of the boresight at `TIME_END` is computed. `RING_SMEAR` is the ratio of this angle with the angular width of the field of view of the detector, or in other words, is the fraction of the field of view that the original intersection point of the boresight has moved between `TIME_ZPD` and `TIME_END`. If the boresight at either `TIME_ZPD` or `TIME_END` is edge on to the rings (in the equatorial plane), then this is set to -200. These computations are done in the J2000 inertial frame, so the rotation of the primary does not contribute to the smear. This also means that the Keplerian motion of the ring particles does not contribute to the smear. Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

RING_LOCAL_TIME

This contains the ring local hour angle in the primary’s coordinate system for the intercept of the Q points in the ring plane. It is encoded by

$$\text{RING_LOCAL_TIME} = 100 \times \text{hour} + \text{min} + \text{sec}/100 \quad (2)$$

Set to -200 if the ray falls outside the rings or the primary is in front of the rings.

3.6.10 TAR tables

These tables describe which, if any, of the various targets are in the field of view of a given detector. Individual fields (e.g. TITAN) are set to 1 or 0 according to whether the body appears in the FOV or not. Any, all or none of these fields may be specified individually to select data with a particular subset of bodys in the FOV. Additionally, the field FOV_TARGETS contains the same information as the individual byte fields, except stored as bits in a single 4-byte integer. This may provide a useful shorthand for selecting an exact target body combination.

Fields:

SCET

Spacecraft Event Time (UT) (seconds from 1/1/70). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample.

DET

The detector ID. See Table 1.

FOV_TARGETS

A bitfield with a single bit for each of the targets that Cassini might observe. If the bit is 0, the object isn't in the field of view. If it's 1, it may or may not be, subject to the following conditions. For the planets and their satellites, a fixed angular width "penumbra" is attached outside their "surfaces" (for satellites, their actual hard surfaces, for Jupiter and Saturn, the 1 bar level in their atmospheres). The angular width of the penumbra is detector and body dependent. If any of the lines of sight of the 9 Q points intersects either the object or the penumbra, this bit is 1. If the center of the object is entirely inside the field of view of the detector, this bit is 1 (this condition is to account for objects small enough to fit entirely inside the detector and miss all of the Q points). A crude ring model is used. If the lines of sight of the Q points hit the equatorial plane of the primary within a fixed radius (129400 km for Jupiter, 140270 km for Saturn), and the primary isn't hit first, then the ring bit is 1. Otherwise, the ring bit is zero.

Bit assignments are as follows:

00000000000000000000000000000000	0	space (no recognized target)
000000000000000000000000000000001	2 ⁰	Jupiter rings
000000000000000000000000000000010	2 ¹	Jupiter
0000000000000000000000000000000100	2 ²	Io
00000000000000000000000000000001000	2 ³	Europa
000000000000000000000000000000010000	2 ⁴	Ganymede
0000000000000000000000000000000100000	2 ⁵	Callisto
00000000000000000000000000000001000000	2 ⁶	Saturn
000000000000000000000000000000010000000	2 ⁷	Mimas
0000000000000000000000000000000100000000	2 ⁸	Enceladus
00000000000000000000000000000001000000000	2 ⁹	Tethys

DIONE Set to 1 if Dione is in the FOV, 0 otherwise.
 RHEA Set to 1 if Rhea is in the FOV, 0 otherwise.
 TITAN Set to 1 if Tian is in the FOV, 0 otherwise.
 HYPERION Set to 1 if Hyperion is in the FOV, 0 otherwise.
 IAPETUS Set to 1 if Iapetus is in the FOV, 0 otherwise.
 PHOEBE Set to 1 if Phoebe is in the FOV, 0 otherwise.
 JANUS Set to 1 if Janus is in the FOV, 0 otherwise.
 EPHMETHEUS Set to 1 if Epimetheus is in the FOV, 0 otherwise.
 HELENE Set to 1 if Helene is in the FOV, 0 otherwise.
 TELESTO Set to 1 if Telesto is in the FOV, 0 otherwise.
 CALYPSO Set to 1 if Calypso is in the FOV, 0 otherwise.
 ATLAS Set to 1 if Atlas is in the FOV, 0 otherwise.
 PROMETHEUS Set to 1 if Prometheus is in the FOV, 0 otherwise.
 PANDORA Set to 1 if Pandora is in the FOV, 0 otherwise.
 PAN Set to 1 if Pan is in the FOV, 0 otherwise.
 METHONE Set to 1 if Methone is in the FOV, 0 otherwise.
 DAPHNIS Set to 1 if Daphnis is in the FOV, 0 otherwise.
 PALLENE Set to 1 if Pallene is in the FOV, 0 otherwise.
 POLYDEUCES Set to 1 if Polydeuces is in the FOV, 0 otherwise.
 AEGAEON Set to 1 if Aegaeon is in the FOV, 0 otherwise.
 SRING Set to 1 if Saturn's rings are in the FOV, 0 otherwise.
 DEEP_SPACE Set to 1 if FOV_TARGETS is zero, 0 otherwise.
 STELLAR Set to 1 if a stellar target is in the FOV, 0 otherwise.

3.6.11 ISPM tables

These tables contain the ‘interpolated’ (resampled) calibrated spectra. The ISPM fragment type is now commonly created, instead of the SPM type (non-resampled), and is the type to be archived. The SPM type created formerly used a ‘natural’ wavelength index resulting from the instrument, which meant that the final spectrum fell on ‘irrational’ wavenumber values such 577.3256, 577.7792, instead of 577.250, 577,500, 577.750 etc. The ISPM type

contains the same spectra, but interpolated and re-sampled onto a more user-friendly grid. There is no loss of resolution or data in this process.

Fields:

SCET

Spacecraft Event Time (UT) (seconds from 1/1/70). Corresponds to the truncated integer time value of the interferogram's first recorded raw data sample. The `cirs_time` utility may be useful for converting text time to SCET.

DET

Detector number (see table 1).

DS_NAVE

Number of spectra used in the deep-space calibration average IFM, during the calibration process. This may pose an intrinsic limit to how many calibrated spectra may be co-added. See `SH_NAVE`.

SH_NAVE

Number of spectra used in the shutter calibration average IFM, during the calibration process. This may pose an intrinsic limit to how many calibrated spectra may be co-added. For example, assume that the shutter is 170 K and the planet spectrum is similar, and `SH_NAVE`=100. Now, consider that we have 500 planet spectra which were calibrated using the same 100-spectrum shutter average. Then, co-adding more than 100 planet spectra will no longer reduce the random noise level any further, because the NESR level of the 100 shutter will become the limiting (biggest) noise source.

TINSTR

The instrument temperature (kelvin). For FP1 (detector 0), the `firpolriztem` from the IHSK tables is used. For the mid-IR (detectors 1–30) the `hsecooltem` from the IHSK is used.

TDET

The detector temperature (kelvin).

FPASET

This is the equivalent set point value based on the actual temperature of the focal plane. Note that this may differ from the set point specified via instrument commands.

DS_TINSTR

An instrument temperature (kelvin) found from an average of instrument temperatures recorded during the collection of the deep space interferograms used to calibrate the spectrum.

DS_TDET

A detector temperature (kelvin) found from an average of detector temperatures recorded during the collection of the deep space interferograms used to calibrate the spectrum.

No.	Apodization Function Name
0	Boxcar (no apodization)
1	Norton & Beer type 1 function
2	Norton & Beer type 2 function
3	Norton & Beer type 3 function
4	Forman type
5	Triangular type
6	Hanning type
7	Hamming type

Table 4: Apodization functions available for post-processing CIRS spectra.

SH_TINSTR

An instrument temperature (kelvin) found from an average of instrument temperatures recorded during the collection of the shutter-closed interferograms used to calibrate the spectrum.

SH_TDET

A detector temperature (kelvin) found from an average of detector temperatures recorded during the collection of the shutter-closed interferograms used to calibrate the spectrum.

IWN_START

The wavenumber of the first point in the spectrum (cm^{-1}). Together with `IWN_STEP` defines the spectrum wavenumber axis.

IWN_STEP

The wavenumber increment size between successive points in the spectrum (cm^{-1}). Together with `IWN_START` defines the spectrum wavenumber axis.

APODTYPE

The number of the apodization type applied to the final spectrum (if any). See table 4. Apodization is the process of suppressing side-lobes (‘ripples’) of the ILS by tapering the IFM in the spatial dimension, before FFTing.

FWHM

The Full-Width at Half-Maximum of the idealised monochromatic instrumental line shape (ILS) in cm^{-1} . If the spectrum is apodized, then it is the apodized FWHM.

RAYLEIGH

The ‘Rayleigh’ resolution of the spectrum (cm^{-1}). Actually, the distance from the peak of an isolated line to the first ‘null’ (zero-crossing, not minimum) in the ILS. (Rayleigh resolution is actually defined on the basis of a line doublet being resolved, not individual spectral lines).

NYQUIST

The Nyquist bin size (cm^{-1}), or intrinsic resolution limit. This is equivalent to the width of the bandpass divided by the number of interferogram samples. This number

gives a measure of how far the actual resolution achieved, perhaps after apodization, differs from the ‘natural’ resolution of the instrument.

POWER

The integrated radiance under the power spectrum ($\text{W cm}^{-2} \text{ sr}^{-1}$).

DS_SCET

The mean scet time of the deep space scan block used to create the deep space average IFM used in the calibration of the current target IFM.

DS_SH_SCET

The mean scet time of the shutter scan block used to create the shutter average IFM used in the calibration of the current target IFM.

CTZPD1

The interpolated position of the global ZPD minimum within the central burst region of the interferogram after phase correction (if any).

CTZPD2

The interpolated position of the global ZPD maximum within the central burst region of the interferogram after phase correction (if any).

PHASE_SHIFT

The phase shift amount given to the complex target spectrum in order to do a time-shift of the interferogram.

PHASE_SHIFT_FLAG

If the phase shift algorithm is found to be ineffective at shifting the interferogram, `PHASE_SHIFT_FLAG` is set to 1. This would be the case if the interferogram is perturbed around ZPD. Otherwise it is 0.

PHASE_SHIFT_ERROR

The sum of the `PHASE_SHIFT_FLAG` for all active detectors with the same SCET. It is used to find SCET times with unusable ZPD positions.

DS_TZPD1

The interpolated ZPD position of the global minimum within the central burst region of an average interferogram found from the deep space interferograms used in the calibration.

DS_TZPD2

The interpolated ZPD position of the global maximum within the central burst region of an average interferogram found from the deep space interferograms used in the calibration.

DIST_DS_TZPD1

The ZPD global minimum position difference between the target and the deep space interferograms. It is used to detect baseline drift.

DIST_DS_TZPD2

The ZPD global maximum position difference between the target and the deep space interferograms. It is used to detect baseline drift.

SH_TZPD1

The interpolated ZPD position of the global minimum within the central burst region of an average interferogram found from the shutter-closed interferograms used in the calibration.

SH_TZPD2

The interpolated ZPD position of the global maximum within the central burst region of an average interferogram found from the shutter-closed interferograms used in the calibration.

DIST_SH_TZPD1

The ZPD global minimum position difference between the target and the shutter-closed interferograms. It is used to detect baseline drift.

DIST_SH_TZPD2

The ZPD global maximum position difference between the target and the shutter-closed interferograms. It is used to detect baseline drift.

DIST_DSSH_TZPD1

The ZPD global minimum position difference between the deep space and the shutter-closed interferograms. It is used to detect baseline drift.

DIST_DSSH_TZPD2

The ZPD global maximum position difference between the deep space and the shutter-closed interferograms. It is used to detect baseline drift.

CALIB_SCORE1

The variance of the imaginary part of the complex spectrum before applying any phase correction. It is used to detect excessive noise conditions or phase anomalies.

CALIB_SCORE2

The cross-correlation between the real part and imaginary part of the complex spectrum before applying any phase correction. It is used to detect excessive noise conditions or phase anomalies.

CALIB_SCORE3

The variance of the imaginary part of the complex spectrum after applying any phase correction. It is used to detect excessive noise conditions or phase anomalies.

CALIB_SCORE4

The cross-correlation between the real part and imaginary part of the complex spectrum after applying any phase correction. It is used to detect excessive noise conditions or phase anomalies.

LASER_WL

The assumed reference interferometer laser wavelength (nm).

ISPTS

Number of points in the regridded spectrum.

ISPM

A pointer to the spectrum in the associated variable-length record (.VAR) file. The spectral data points are radiance in units of ($\text{W cm}^{-2} \text{ sr}^{-1} (\text{cm}^{-1})^{-1}$).

3.6.12 OISPM tables

The OISPM tables hold calibrated spectra of potentially reduced quality due to noise artifacts and/or unsupported detector temperatures. The tables have the same format and fields as the ISPM tables except the ISPM field has been renamed to OISPM.

During the calibration process, a filtering and noise detection algorithm is applied to the data to determine the quality of the interferograms. The algorithm looks for anomalies in the number of interferogram sample points (typically from scan mechanism velocity variations), dual zero phase difference (ZPD) peaks, and irregular sampling (see the NOISE field in DIAG table). While shortened interferograms or dual ZPD interferograms are not usable, interferograms with moderate sampling perturbations can produce calibrated spectra, but they may be of lower quality or noisier than spectra calibrated without anomalies. To ensure users of these lower quality spectra are aware of the data's limitations, a new table, OISPM, has been created and placed in a directory (DATA/TSDR/SUSPECT_SPECTRA) separate from the nominal spectra, forcing it to be queried independently of the ISPM tables.

Also critical to the calibration process, the temperature of the focal plane assembly (IHSK.FPATEM) of the mid-infrared focal plane assembly (FPA) must be taken into account. This temperature is defined by the thermal balance between the 70K cooler and a heater placed near the detectors. During a CIRS observation, the temperature of the FPA is set to one or more of a discrete set of values where each value (set point) corresponds to a temperature range of 0.4 K about values spaced 0.75 K apart. If the instrument is not thermally stable or if the sun, Saturn, or Saturn's rings illuminate the FPA radiator, the FPA may not be operating at a nominal, steady, controlled temperature. Because the mid-infrared detector responsivities are dependent on the FPA temperature, in order to be properly calibrated, target interferograms should be matched with averages of deep space data acquired at the same FPA temperature (set point). If the target and deep space interferogram FPA temperatures cannot be matched, nearby deep space data (in time) at a different temperature will be used, with the resulting calibrated spectra placed in the OISPM table.

There are several additional cases in which the calibration of an interferogram was determined to be questionable, causing its spectrum to be placed in the OISPM table:

- The calibration accuracy is dependent on the number of deep space interferograms averaged together. If too few are available, the noise increases to unacceptable levels,

and the spectrum becomes suspect.

- During the mission, the laser state (DIAG.LASER) changed modes several times which caused some instrument recording modes to have little or no reference data. Calibrating target data with reference data from a similar, but different, instrument mode caused small mismatches in the wavelength scale.
- A subset of the data used a mode for which interferograms were co-added time-wise. This sometimes affected the noise spike pattern making it difficult for the de-spiking algorithm to do its job. This was exacerbated if no co-added reference data was available.

4 Software

4.1 Vanilla software

The MGS TES project has produced a software tool that not only reads the PDS table and the variable length records, but is also capable of joining the related records among multiple tables. This piece of software is called ‘vanilla’ and was offered for use by the CIRS team. Vanilla is included on every volume, along with the *Vanilla Users Guide* (written for MGS-TES, but nevertheless useful). See also the examples in CIRS-USER-GUIDE.PDF and the document **Vanilla Examples with the CIRS database** (cirs_vanilla_examples.pdf).

The Vanilla program was developed for use on both LSB and MSB machines.

4.2 PDS software

The CIRS team does not use any PDS software to process or view the data. However the tables are stored using the PDS TABLE standard structure and any tool that understands that structure should be able to read all of the data except the variable length spectra.

A Acronyms and Abbreviations

BIU Bus Interface Unit; interface to spacecraft bus.

CIRS Composite Infrared Spectrometer.

FIR Far Infra-Red.

FOV Field Of View.

FWHM Full-width to half maximum. A measure of spectral line width or FOV width.

IDS Instrument Data System.

IFM Interferogram.

ILS Instrumental Line Shape

LSB Least Significant Bit, data storage convention.

MIR Mid Infra-Red.

MGS Mars Global Surveyor spacecraft.

MSB Most Significant Bit, data storage convention.

NAIF Navigation and Ancilliary Information Facility

NESR Noise Equivalent Spectral Radiance

ODL Object Description Lanaguage.

PDS Planetary Data System.

RTI Real Time Interrupt ($= 1/8$ sec).

TCM Temperature Controller Monitor.

TES Thermal Emission Spectrometer (on MGS).

TSDR Time Sequential Data Records.

ZPD Zero-Path Difference; IFM peak.

B Example source code for computing SCET time

The following short program `cirs_time`, written in ANSI standard C language will convert between calendar date/time to/from SCET time (seconds since 00:00:00 January 1st 1970). There are three input formats:

- `cirs_time 07/01/04 00:00:00`
returns:
1088640000
- `cirs_time 1088640000`
returns:
(DOY 183) Thu Jul 1 00:00:00 2004
- `cirs_time 2004-183T00:00:00`
returns:
1088640000

Source code is:

```
#define _GNU_SOURCE
#include <stdlib.h>
#include <stdio.h>
#include <time.h>
#include <string.h>

void proc_ascii_str(char *, char *);

int main(int argc, char *argv[])
{
    long t;
    char taskstr[50], fmt[20];
    struct tm *thistm;

    if ((argc == 1) || (!strcmp(argv[1], "-h")) || (!strcmp(argv[1], "-help"))) {
        printf("\n cirs_time: usage: \n\n");
        printf("\t cirs_time <SCET> \t \t converts to text string. \n");
        printf("\t cirs_time MM/DD/YY HH:MM:SS \t converts to SCET. \n");
        printf("\t cirs_time -h \t \t \t prints this help. \n");
        printf("\t cirs_time -help \t \t prints this help. \n\n");
        exit(0);
    }

    if (argc == 2) {

        /* we consider two possibilities here: a numeri
```

```

        or a year-doyTtime string */

if (strchr(argv[1], 'T') == NULL) {

    /* convert from ASCII to time_t (long) */
    t = (time_t) atol(argv[1]);
    /* convert from time_t to struct tm */
    thistm = gmtime(&t);
    /* convert to ASCII */
    printf("(DOY %d) %s", (thistm->tm_yday)+1, asctime(thistm));

} else {

    sprintf(fmt, "%s", "%Y-%jT%T");
    proc_ascii_str(argv[1], fmt);

}

} else if (argc == 3) {

    sprintf(taskstr, "%s %s", argv[1], argv[2]);
    sprintf(fmt, "%s", "%D %T");
    proc_ascii_str(taskstr, fmt);

} else {
    printf("No time argument specified.\n");
    exit(1);
}

exit(0);
}

/* subroutine: convert from ASCII to SCET */

void proc_ascii_str(char *timestr, char *fmt)
{
    struct tm *thistm;
    char *result;

    thistm = (struct tm *) malloc((size_t) sizeof(struct tm));
    result = strptime(timestr, fmt, thistm);

    if (result == NULL) {
        printf("strptime failed to interpret string.\n");
        exit(1);
    } else {
        printf("%ld\n", (long) mktime(thistm));
        free(thistm);
    }
}

```

```
    }  
    return;  
}
```

C Data format files

C.1 OBS.FMT

COLUMNS	= 48
ROW_BYTES	= 68
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "packet time"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCLK
DATA_TYPE	= PC_REAL
START_BYTE	= 5
BYTES	= 8
DESCRIPTION	= "spacecraft clock time "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RTI
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 13
BYTES	= 2
DESCRIPTION	= "Length of scan in Real Time Interrupts (1/8 sec) "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP3_MODE
DATA_TYPE	= CHARACTER
START_BYTE	= 15
BYTES	= 1
DESCRIPTION	= "FP3 array pixel mode: O(dd), E(ven), C(enter), P(airs) "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP4_MODE
DATA_TYPE	= CHARACTER
START_BYTE	= 16
BYTES	= 1

DESCRIPTION	= "FP4 array pixel mode: O(dd), E(ven), C(enter), P(airs) "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FIR_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 17
BYTES	= 1
DESCRIPTION	= "Overflow detected on FIR accumulation"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FP1_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 18
BYTES	= 1
DESCRIPTION	= "Overflow on FP1 average buffer"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FP3_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 19
BYTES	= 1
DESCRIPTION	= "Overflow on FP3 average buffer"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FP4_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 20
BYTES	= 1
DESCRIPTION	= "Overflow on FP4 average buffer"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FP1_COMP_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 21
BYTES	= 1
DESCRIPTION	= "Overflow on compression buffer 1"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FP3_COMP_OVERFLOW
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 22

```

        BYTES                = 1
        DESCRIPTION          = "Overflow on compression buffer 3"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP4_COMP_OVERFLOW
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 23
        BYTES                = 1
        DESCRIPTION          = "Overflow on compression buffer 4"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP3_ZERO
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 24
        BYTES                = 1
        DESCRIPTION          = "Detected 0000H on FP3 raw data"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP3_OFFF
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 25
        BYTES                = 1
        DESCRIPTION          = "Detected OFFFH on FP3 raw data"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP1_ZERO
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 26
        BYTES                = 1
        DESCRIPTION          = "Detected 0000H on FP1 raw data"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP1_OFFF
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 27
        BYTES                = 1
        DESCRIPTION          = "Detected OFFFH on FP1 raw data"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FP4_ZERO
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 28

```

```

        BYTES = 1
        DESCRIPTION = "Detected 0000H on FP4 raw data"
    END_OBJECT

    OBJECT = COLUMN
        NAME = FP4_OFFF
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 29
        BYTES = 1
        DESCRIPTION = "Detected OFFFH on FP4 raw data"
    END_OBJECT

    OBJECT = COLUMN
        NAME = COADD
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 30
        BYTES = 1
        DESCRIPTION = "Coadding enabled"
    END_OBJECT

    OBJECT = COLUMN
        NAME = SCIENCE_OVERWRITTEN
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 31
        BYTES = 1
        DESCRIPTION = "Science data overwritten condition detected"
    END_OBJECT

    OBJECT = COLUMN
        NAME = FLYBACK_EXCEEDED
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 32
        BYTES = 1
        DESCRIPTION = "Flyback exceeded"
    END_OBJECT

    OBJECT = COLUMN
        NAME = SCAN_EXCEEDED
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 33
        BYTES = 1
        DESCRIPTION = "Scan exceeded"
    END_OBJECT

    OBJECT = COLUMN
        NAME = MECHANISM_ENABLED
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 34

```

```

        BYTES                = 1
        DESCRIPTION          = "Mechanism enabled"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = MECH_OUT_OF_PHASE
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 35
        BYTES                  = 1
        DESCRIPTION           = "Mechanism out of phase some time"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = LASER_A_ENABLED
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 36
        BYTES                  = 1
        DESCRIPTION           = "Laser A enabled"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = LASER_B_ENABLED
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 37
        BYTES                  = 1
        DESCRIPTION           = "Laser B enabled"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = MECH_CMDED
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 38
        BYTES                  = 1
        DESCRIPTION           = "Enable mechanism cmded"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = WHITE_OVERRIDE
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 39
        BYTES                  = 1
        DESCRIPTION           = "White light override"
    END_OBJECT

    OBJECT                    = COLUMN
        NAME                  = OPTICAL_SENSE_MODE
        DATA_TYPE            = LSB_UNSIGNED_INTEGER
        START_BYTE            = 40

```

```

        BYTES = 1
        DESCRIPTION = "Optical sensor (0), decs (1) mode"
    END_OBJECT

    OBJECT = COLUMN
        NAME = SHUTTER
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 41
        BYTES = 1
        DESCRIPTION = "Shutter open (0), closed (1)"
    END_OBJECT

    OBJECT = COLUMN
        NAME = RIE_LASCMD_LSB
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 42
        BYTES = 1
        DESCRIPTION = "RIE: LASCMD_LSB Lamp current select"
    END_OBJECT

    OBJECT = COLUMN
        NAME = RIE_LASCMD_MSB
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 43
        BYTES = 1
        DESCRIPTION = "RIE: LASCMD_MSB Lamp current select"
    END_OBJECT

    OBJECT = COLUMN
        NAME = RIE_LASCMD_A
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 44
        BYTES = 1
        DESCRIPTION = "RIE: LASCMD_A Lamp A select"
    END_OBJECT

    OBJECT = COLUMN
        NAME = RIE_LASCMD_B
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 45
        BYTES = 1
        DESCRIPTION = "RIE: LASCMD_B Lamp B select"
    END_OBJECT

    OBJECT = COLUMN
        NAME = RAW_NO_SET
        DATA_TYPE = LSB_UNSIGNED_INTEGER
        START_BYTE = 46

```

BYTES	= 2
DESCRIPTION	= "Count of raw samples without set control bits"
END_OBJECT	
OBJECT	= COLUMN
NAME	= RAW_FP1_COUNT
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 48
BYTES	= 2
DESCRIPTION	= "Number of FP1 samples read in this scan"
END_OBJECT	
OBJECT	= COLUMN
NAME	= RAW_FP3_COUNT
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 50
BYTES	= 2
DESCRIPTION	= "Number of FP3 samples read in this scan"
END_OBJECT	
OBJECT	= COLUMN
NAME	= RAW_FP4_COUNT
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 52
BYTES	= 2
DESCRIPTION	= "Number of FP4 samples read in this scan"
END_OBJECT	
OBJECT	= COLUMN
NAME	= FIRST_SAMPLE_RTI
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 54
BYTES	= 2
DESCRIPTION	= "RTI value when 1st sample in scan collected"
END_OBJECT	
OBJECT	= COLUMN
NAME	= SCET_MSEC
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 56
BYTES	= 2
DESCRIPTION	= "Fractional part of observation SCET"
END_OBJECT	
OBJECT	= COLUMN
NAME	= COMPUTED_RTI
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 58

```

        BYTES                = 1
        DESCRIPTION          = "computed number of RTIs during scan"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = CONSECUTIVE_NULL_SCANS
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 59
        BYTES                = 1
        DESCRIPTION          = "number of consecutive scans with 0 raw samples"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = IDS_MUX
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 60
        BYTES                = 1
        DESCRIPTION          = "IDS MUX channel number"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = TCM_MUX
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 61
        BYTES                = 1
        DESCRIPTION          = "TCM MUX channel number"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = PACKETIZATION_STATUS
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 62
        BYTES                = 2
        DESCRIPTION          = "bits 0-4 FP3 chan 1-5; bits 5-9 FP4; 0=enabled"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = MSEC_SINCE_RTI
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 64
        BYTES                = 1
        DESCRIPTION          = "millisec between RTI pulse and flyback signal"
    END_OBJECT

    OBJECT                   = COLUMN
        NAME                 = FSV
        DATA_TYPE           = LSB_INTEGER
        START_BYTE           = 65

```

```

        BYTES                = 2
        DESCRIPTION          = "Flight software version ASSUMED IN PROCESSING"
END_OBJECT

OBJECT                      = COLUMN
    NAME                    = SCAN_FLYBACK_MSEC
    DATA_TYPE              = LSB_UNSIGNED_INTEGER
    START_BYTE              = 67
    BYTES                   = 2
    DESCRIPTION             = "millisec from scan start to flyback"
END_OBJECT

```

C.2 FRV.FMT

```

COLUMNS                   = 3
ROW_BYTES                  = 10

OBJECT                     = COLUMN
    NAME                   = SCET
    DATA_TYPE             = LSB_UNSIGNED_INTEGER
    START_BYTE             = 1
    BYTES                  = 4
    DESCRIPTION            = "scan time "
END_OBJECT                 = COLUMN

OBJECT                     = COLUMN
    NAME                   = NFRV
    DATA_TYPE             = LSB_INTEGER
    START_BYTE             = 5
    BYTES                  = 2
    DESCRIPTION            = "number of fringe voltage samples "
END_OBJECT                 = COLUMN

OBJECT                     = COLUMN
    NAME                   = FRV
    DATA_TYPE             = LSB_INTEGER
    START_BYTE             = 7
    BYTES                  = 4
    VAR_DATA_TYPE          = PC_REAL
    VAR_ITEM_BYTES         = 8
    VAR_RECORD_TYPE        = VAX_VARIABLE_LENGTH
    DESCRIPTION            = "pointer to fringe voltage data "
END_OBJECT                 = COLUMN

```


C.3 IFGM.FMT

COLUMNS	= 4
ROW_BYTES	= 11
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "SCAN TIME "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 5
BYTES	= 1
DESCRIPTION	= "DETECTOR NUMBER "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= NPTS
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 6
BYTES	= 2
DESCRIPTION	= "NUMBER OF POINTS IN INTERFEROGRAM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IFGM
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 8
BYTES	= 4
VAR_DATA_TYPE	= LSB_INTEGER
VAR_ITEM_BYTES	= 2
VAR_RECORD_TYPE	= VAX_VARIABLE_LENGTH
DESCRIPTION	= "POINTER TO INTERFEROGRAM DATA "
END_OBJECT	= COLUMN

C.4 HSK.FMT

COLUMNS	= 89
ROW_BYTES	= 468

OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "SPACECRAFT EVENT TIME"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSSTAT0
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 5
BYTES	= 2
DESCRIPTION	= "IDS SYSTEM STATUS WORD 0"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSSTAT1
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 7
BYTES	= 2
DESCRIPTION	= "IDS SYSTEM STATUS WORD 1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSSTAT2
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 9
BYTES	= 2
DESCRIPTION	= "IDS SYSTEM STATUS WORD 2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERRO
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 11
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 0"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR1
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 13
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 1"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= IDSERR2
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 15
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR3
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 17
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 3"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR4
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 19
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 4"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR5
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 21
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 5"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR6
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 23
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 6"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSERR7
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 25
BYTES	= 2
DESCRIPTION	= "IDS Error Status Word 7"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PCASTAT
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 27
BYTES	= 2
DESCRIPTION	= "PCA Status Echo Word"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SMERIESTAT
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 29
BYTES	= 2
DESCRIPTION	= "SME/RIE Status Echo Word"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP3LASTCMD
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 31
BYTES	= 2
DESCRIPTION	= "FP3 Last Command"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP4LASTCMD
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 33
BYTES	= 2
DESCRIPTION	= "FP4 Last Command"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TCMLASTCMD
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 35
BYTES	= 2
DESCRIPTION	= "TCM Last Command"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSCMDREC
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 37
BYTES	= 2
DESCRIPTION	= "IDS Command Packets Received Count"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= IDSCMDEXE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 39
BYTES	= 2
DESCRIPTION	= "IDS Command Packets Executed Count"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSCMDREJ
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 41
BYTES	= 2
DESCRIPTION	= "IDS Command Packets Rejected Count"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP1MAX
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 43
BYTES	= 2
DESCRIPTION	= "FP1 Maximum Raw Sample"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP3MAX
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 45
BYTES	= 2
DESCRIPTION	= "FP3 Maximum Raw Sample"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FP4MAX
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 47
BYTES	= 2
DESCRIPTION	= "FP4 Maximum Raw Sample"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FRINGEMAX
DATA_TYPE	= PC_REAL
START_BYTE	= 49
BYTES	= 8
DESCRIPTION	= "Fringe Maximum Voltage"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FRINGEMIN
DATA_TYPE	= PC_REAL
START_BYTE	= 57
BYTES	= 8
DESCRIPTION	= "Fringe Minimum Voltage"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PENDINGTTAG
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 65
BYTES	= 2
DESCRIPTION	= "Number of Pending Time Tagged Commands"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= CODECHK
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 67
BYTES	= 2
DESCRIPTION	= "Code Checksum"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= REJECTOP
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 69
BYTES	= 2
DESCRIPTION	= "Last Cmd Rejected Opcode"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= CMDSEQTAB
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 71
BYTES	= 2
DESCRIPTION	= "LOADED COMMAND SEQUENCE TABLE NUMBER PLAYBACK"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PCA_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 73
BYTES	= 8
DESCRIPTION	= "PCA A Board Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PCA_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 81
BYTES	= 8
DESCRIPTION	= "PCA B Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PCA_CTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 89
BYTES	= 8
DESCRIPTION	= "PCA C Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SME_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 97
BYTES	= 8
DESCRIPTION	= "SME A Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SME_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 105
BYTES	= 8
DESCRIPTION	= "SME B Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RIE_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 113
BYTES	= 8
DESCRIPTION	= "RIE A Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FEE_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 121
BYTES	= 8
DESCRIPTION	= "FEE A Board Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FEE_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 129
BYTES	= 8
DESCRIPTION	= "FEE B Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FEE_CTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 137
BYTES	= 8
DESCRIPTION	= "FEE C Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FEE_DTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 145
BYTES	= 8
DESCRIPTION	= "FEE D Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TCM_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 153
BYTES	= 8
DESCRIPTION	= "TCM A Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TCM_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 161
BYTES	= 8
DESCRIPTION	= "TCM B Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCIPKTMUX
DATA_TYPE	= PC_REAL
START_BYTE	= 169
BYTES	= 8
DESCRIPTION	= "(PRESLEEP)/ Science Packet MUX information"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PROCESSORTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 177
BYTES	= 8
DESCRIPTION	= "Processor Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BIUTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 185
BYTES	= 8
DESCRIPTION	= "BIU Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ADCTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 193
BYTES	= 8
DESCRIPTION	= "ADC Board Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= MOTORCURRENT
DATA_TYPE	= PC_REAL
START_BYTE	= 201
BYTES	= 8
DESCRIPTION	= "Motor Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DECSPOSN
DATA_TYPE	= PC_REAL
START_BYTE	= 209
BYTES	= 8
DESCRIPTION	= "DECS Position"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= VELERR
DATA_TYPE	= PC_REAL
START_BYTE	= 217
BYTES	= 8
DESCRIPTION	= "Velocity Percent Error"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PHASEERR
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 225
BYTES	= 2
DESCRIPTION	= "Phase Error"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TRANSME
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 227
BYTES	= 2
DESCRIPTION	= " (PRESLEEP)/COMMANDED SME SETTINGS"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TRANRIE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 229
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/COMMANDED RIE SETTINGS"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FRINGEV
DATA_TYPE	= PC_REAL
START_BYTE	= 231
BYTES	= 8
DESCRIPTION	= "Fringe Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RIESMEPOS12V
DATA_TYPE	= PC_REAL
START_BYTE	= 239
BYTES	= 8
DESCRIPTION	= "RIE/SME POSITIVE 15 Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RIESMENEG12V
DATA_TYPE	= PC_REAL
START_BYTE	= 247
BYTES	= 8
DESCRIPTION	= "RIE/SME NEGATIVE 15 Volts"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= RIESMEPOS5V
DATA_TYPE	= PC_REAL
START_BYTE	= 255
BYTES	= 8
DESCRIPTION	= "RIE/SME POSITIVE 5 Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LASERCURRENT
DATA_TYPE	= PC_REAL
START_BYTE	= 263
BYTES	= 8
DESCRIPTION	= "Laser Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LEDCURRENT
DATA_TYPE	= PC_REAL
START_BYTE	= 271
BYTES	= 8
DESCRIPTION	= "LED Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= MUXREADERR
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 279
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/ MUX Reading Error Information"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSPOS15V
DATA_TYPE	= PC_REAL
START_BYTE	= 281
BYTES	= 8
DESCRIPTION	= "IDS POSITIVE 15 Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSNEG15V
DATA_TYPE	= PC_REAL
START_BYTE	= 289
BYTES	= 8
DESCRIPTION	= "IDS NEGATIVE 15 Volts"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= IDSPOS5V
DATA_TYPE	= PC_REAL
START_BYTE	= 297
BYTES	= 8
DESCRIPTION	= "IDS POSITIVE 5 Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TABLELOADCHK
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 305
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/Table Load Memory Checksum"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FPACOEFF
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 307
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/Focal Plane Coefficients Checksum"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCIREJ
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 309
BYTES	= 2
DESCRIPTION	= "(PRELSEEP)/Count of raw samples thrown out because of the sampling rules"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHOTODIODE
DATA_TYPE	= PC_REAL
START_BYTE	= 311
BYTES	= 8
DESCRIPTION	= "Photodiode Monitor"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= HTR80KCURR
DATA_TYPE	= PC_REAL
START_BYTE	= 319
BYTES	= 8
DESCRIPTION	= "80 K Heater Current"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= HTROP_ACURR
DATA_TYPE	= PC_REAL
START_BYTE	= 327
BYTES	= 8
DESCRIPTION	= "Optics Assembly Heater Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= HTRP_MRCURR
DATA_TYPE	= PC_REAL
START_BYTE	= 335
BYTES	= 8
DESCRIPTION	= "Primary Mirror Heater Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= HTRS_MRCURR
DATA_TYPE	= PC_REAL
START_BYTE	= 343
BYTES	= 8
DESCRIPTION	= "Secondary Mirror Heater Current"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TCMREF
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 351
BYTES	= 2
DESCRIPTION	= "TCM Reference"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= HSECOOLTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 353
BYTES	= 8
DESCRIPTION	= "Housing at Cooler I/F Near Ge Lens Temp"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FIRPOLRIZTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 361
BYTES	= 8
DESCRIPTION	= "FIR Input Polarizer Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FP1DETTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 369
BYTES	= 8
DESCRIPTION	= "FP1 Thermopile Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= MECHHSETEM
DATA_TYPE	= PC_REAL
START_BYTE	= 377
BYTES	= 8
DESCRIPTION	= "Scan Mechanism Housing Temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SECMIRRTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 385
BYTES	= 8
DESCRIPTION	= "Secondary Mirror Backside Temp"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMIRRTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 393
BYTES	= 8
DESCRIPTION	= "Primary Mirror Backside at Edge Temp"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SECMIRBAFFTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 401
BYTES	= 8
DESCRIPTION	= "Secondary Mirror Baffle Backside Temp"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PMSUNSHDMLITEM
DATA_TYPE	= PC_REAL
START_BYTE	= 409
BYTES	= 8
DESCRIPTION	= "Primary Mirror Sunshade (MLI Side) Temp"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PMSUNSHDRADTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 417
BYTES	= 8
DESCRIPTION	= "Primary Mirror Sunshade (Rad Side) Temp"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= CONERIMTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 425
BYTES	= 8
DESCRIPTION	= "Cone Rim Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FPATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 433
BYTES	= 8
DESCRIPTION	= "FPA Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PATCHCENTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 441
BYTES	= 8
DESCRIPTION	= "Patch Center Temperature"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= THERMISTORDRV
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 449
BYTES	= 2
DESCRIPTION	= "Thermistor Drive"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= IDSCALIB
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 451
BYTES	= 2
DESCRIPTION	= "IDS Calibration"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= LATERTI
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 453
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/LATE MISSING RTI CNT/BAD SCAN CNT/REUSED MUX VALUES"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSNEG5V
DATA_TYPE	= PC_REAL
START_BYTE	= 455
BYTES	= 8
DESCRIPTION	= "IDS NEGATIVE 5 Volts"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IDSCALIB2
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 463
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/ MUX 58 (IDS Calib [previously not sampled])"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCANLEN
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 465
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/Current scan settings/BIU watchdog induced re-initializations"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BIUERRINFO
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 467
BYTES	= 2
DESCRIPTION	= "(PRESLEEP)/BIU descriptor table error information"
END_OBJECT	= COLUMN

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COLUMNS	= 27
ROW_BYTES	= 212
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PCA_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 5
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PCA_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 13
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PCA_CTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 21
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SME_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 29
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SME_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 37
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= RIE_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 45
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FEE_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 53
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FEE_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 61
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FEE_CTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 69
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FEE_DTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 77
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= TCM_ATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 85
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= TCM_BTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 93
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= PROCESSORTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 101
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= BIUTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 109
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= ADCTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 117
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= HSECOOLTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 125
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FIRPOLRIZTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 133
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= ZINSTRADTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 141
BYTES	= 8
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FP1DETTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 149
BYTES	= 8

END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= MECHHSETEM
DATA_TYPE	= PC_REAL
START_BYTE	= 157
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SECMIRRTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 165
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMIRRTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 173
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SECMIRBAFFTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 181
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PMSUNSHDMLITEM
DATA_TYPE	= PC_REAL
START_BYTE	= 189
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PMSUNSHDRADTEM
DATA_TYPE	= PC_REAL
START_BYTE	= 197
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FPATEM
DATA_TYPE	= PC_REAL
START_BYTE	= 205

BYTES	= 8
END_OBJECT	= COLUMN

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COLUMNS	= 40
ROW_BYTES	= 141

OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "Spacecraft clock time "
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= DET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 5
BYTES	= 1
DESCRIPTION	= "Detector number "
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= BIURTI
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 6
BYTES	= 2
DESCRIPTION	= "RTI offset of 0.5 Hz BIU interference "
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= NOISE
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 8
BYTES	= 2
DESCRIPTION	= "Noise description of interferogram: 1 - Normal: Scan Mechanism Either In Phase or Out of Phase (MECH_OUT_OF_PHASE = 0 or 1) 2 - Invalid Time Stamp 4 - Shutter Opening or Closing 8 - Insufficient Samples 16 - Short NPTS 32 - Long NPTS: 38 RTI Interferograms Only 64 - Incorrect ZPD Position

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128 - Big Spikes
256 - Average Interferogram
512 - Standard Deviation
640 - Standard Deviation Plus Big Spikes
1024 - DC Level
2048 - Drift
2560 - Standard Deviation Plus Drift
4096 - Velocity Variations: Scan Mechanism In Phase
      (MECH_OUT_OF_PHASE = 0)
8192 - Velocity Variations: Scan Mechanism Out of Phase
      (MECH_OUT_OF_PHASE = 1)
5555 - FP1 deep-space IFGMs are assigned NOISE = 5555 if
      SPECTRUM_DIAGNOSTIC = 2, 3 or 4.
6666 - All FP1 IFGMs (target and deep-space) are assigned
      NOISE = 6666 if SPECTRUM_DIAGNOSTIC >= 5.
7777 - FP1, FP3 and FP4 shutter-closed IFGMs whose rawpowers are
      not within the established minima and maxima are assigned
      NOISE = 7777.
8888 - FP1, FP3 and FP4 deep-space IFGMs whose rawpowers are not
      within the established minima and maxima are assigned
      NOISE = 8888.
      "
END_OBJECT          = COLUMN

OBJECT              = COLUMN
  NAME              = DSCAL
  DATA_TYPE        = LSB_INTEGER
  START_BYTE        = 10
  BYTES              = 1
  DESCRIPTION        = "1 = DSCAL, 0 = Non-DSCAL "
END_OBJECT          = COLUMN

OBJECT              = COLUMN
  NAME              = LASER
  DATA_TYPE        = LSB_INTEGER
  START_BYTE        = 11
  BYTES              = 1
  DESCRIPTION        = "Frequency mode at which the laser was operating
                        at a particular time. See PDS file DATASIS.PDF
                        to see the list of times and laser modes."
END_OBJECT          = COLUMN

OBJECT              = COLUMN
  NAME              = WN8HZSPIKE
  DATA_TYPE        = PC_REAL
  START_BYTE        = 12
  BYTES              = 4
  DESCRIPTION        = "Frequency in cm-1 of FP1 8 Hz spike "

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END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FWHM8HZSPIKE
DATA_TYPE	= PC_REAL
START_BYTE	= 16
BYTES	= 4
DESCRIPTION	= "FWHM in cm-1 of FP1 8 Hz spike "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= WNSINE
DATA_TYPE	= PC_REAL
START_BYTE	= 20
BYTES	= 4
DESCRIPTION	= "Frequency in cm-1 of FP1 Sine Wave "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FWHMSINE
DATA_TYPE	= PC_REAL
START_BYTE	= 24
BYTES	= 4
DESCRIPTION	= "FWHM in cm-1 of FP1 Sine Wave "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASESINE
DATA_TYPE	= PC_REAL
START_BYTE	= 28
BYTES	= 4
DESCRIPTION	= "Phase of FP1 Sine Wave (radians) "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RATIO_FWHM_HALF_HZ
DATA_TYPE	= PC_REAL
START_BYTE	= 32
BYTES	= 4
DESCRIPTION	= "Ratio of FP1 0.5 Hz Spike FWHMs "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RATIO_WN_EIGHT_HZ
DATA_TYPE	= PC_REAL
START_BYTE	= 36
BYTES	= 4
DESCRIPTION	= "Ratio of FP1 8 Hz Spike WNs "

END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RATIO_FWHM_EIGHT_HZ
DATA_TYPE	= PC_REAL
START_BYTE	= 40
BYTES	= 4
DESCRIPTION	= "Ratio of FP1 8 Hz Spike FWHMs "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RAWPOWER
DATA_TYPE	= PC_REAL
START_BYTE	= 44
BYTES	= 4
DESCRIPTION	= "power in uncalibrated FFT "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RATIO_EIGHT_HZ_SPIKE_AMPLITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 48
BYTES	= 4
DESCRIPTION	= "ratio of FP1 8 Hz spike power spectrum amplitude after/before spike suppression "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DELTA_BIURTI
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 52
BYTES	= 2
DESCRIPTION	= "BIURTI_Offset difference between the two interferograms in a coadded pair "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FIFM_STD_DEV
DATA_TYPE	= PC_REAL
START_BYTE	= 54
BYTES	= 4
DESCRIPTION	= "Standard deviation of the flat region (beyond the two-sided ZPD region) of a filtered interferogram "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SPECTRUM_DIAGNOSTIC

DATA_TYPE	= LSB_INTEGER
START_BYTE	= 58
BYTES	= 2
ALIAS_NAME	= FIFM_ID
DESCRIPTION	= "Description of success of the FP1 de-spiking:

SPECTRUM_DIAGNOSTIC = 0:

BIURTI_Offset = 0 - 15 and 22:

(1) The cross correlation between the 0.5 Hz deep-space waveform ("comb") and the 0.5 Hz spikes in the interferogram was found. (2) The interferogram was successfully de-spiked by the de-spike algorithm.

SPECTRUM_DIAGNOSTIC = 1:

BIURTI_Offset = 0 - 15 and 22:

(1) The de-spike algorithm found sufficient 0.5 Hz spikes in both the first and second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs. (2) Delta_Op5_Hz_BIURTI_Offset != +/- 1.

SPECTRUM_DIAGNOSTIC = 2:

BIURTI_Offset = 0 - 15 and 22:

(1) The de-spike algorithm could not find sufficient 0.5 Hz spikes in either the first or second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs. (2) Delta_Op5_Hz_BIURTI_Offset = +/- 1.

SPECTRUM_DIAGNOSTIC = 3:

BIURTI_Offset = 0 - 15 and 22:

(1) The de-spike algorithm could not find sufficient 0.5 Hz spikes in either the first or second 97 RTI, 225 RTI, or 401 RTI interferogram in a COADDED pair that match the 0.5 Hz spikes in the shifted 0.5 Hz combs. (2) Delta_Op5_Hz_BIURTI_Offset != +/- 1.

SPECTRUM_DIAGNOSTIC = 4: The FP1 8 Hz spike is marginally suppressed:

Amplitude_8_Hz_Spike_After_Spike_Suppression/
 Amplitude_8_Hz_Spike > Ratio_8_Hz_Spike_Amplitude_Min &&
 Amplitude_8_Hz_Spike_After_Spike_Suppression/
 Amplitude_8_Hz_Spike < Ratio_8_Hz_Spike_Amplitude_Max

SPECTRUM_DIAGNOSTIC = 5:

The FP1 8 Hz spike is not sufficiently suppressed:

Amplitude_8_Hz_Spike_After_Spike_Suppression/
 Amplitude_8_Hz_Spike >= Ratio_8_Hz_Spike_Amplitude_Max

SPECTRUM_DIAGNOSTIC = 6:

The FP1 sine wave could not be detected

SPECTRUM_DIAGNOSTIC = 7:

BIURTI_Offset = 66:

No cross correlation between the 0.5 Hz
deep-space waveform ("comb") and the 0.5 Hz spikes in the
interferogram could be found.

SPECTRUM_DIAGNOSTIC = 8:

BIURTI_Offset = 77, 88, or 99:

The de-spike algorithm could
not find sufficient 0.5 Hz spikes in the interferogram that
match the 0.5 Hz spikes in the shifted 0.5 Hz comb. "

END_OBJECT = COLUMN

OBJECT = COLUMN

NAME = TZPD

DATA_TYPE = PC_REAL

START_BYTE = 60

BYTES = 4

DESCRIPTION = "true zpd position (interpolated ifm) "

END_OBJECT = COLUMN

OBJECT = COLUMN

NAME = TAMP

DATA_TYPE = PC_REAL

START_BYTE = 64

BYTES = 4

DESCRIPTION = "true (interpolated) ifm amplitude "

END_OBJECT = COLUMN

OBJECT = COLUMN

NAME = ZPDENV

DATA_TYPE = PC_REAL

START_BYTE = 68

BYTES = 4

DESCRIPTION = "envelope zpd position (interpolated ifm) "

END_OBJECT = COLUMN

OBJECT = COLUMN

NAME = AMPENV

DATA_TYPE = PC_REAL

START_BYTE = 72

BYTES = 4

DESCRIPTION = "envelope (interpolated) ifm amplitude "

END_OBJECT = COLUMN

OBJECT	= COLUMN
NAME	= IFM_DC_LEVEL
DATA_TYPE	= PC_REAL
START_BYTE	= 76
BYTES	= 4
DESCRIPTION	= "Interferogram DC level for FP1, FP3, and FP4 "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= STD_DEV_BEFORE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 80
BYTES	= 4
DESCRIPTION	= "Standard Deviation before ZPD region "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= STD_DEV_ZPD_REGION
DATA_TYPE	= PC_REAL
START_BYTE	= 84
BYTES	= 4
DESCRIPTION	= "Standard Deviation in ZPD region "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= STD_DEV_AFTER_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 88
BYTES	= 4
DESCRIPTION	= "Standard Deviation after ZPD region "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA1_MIN
DATA_TYPE	= PC_REAL
START_BYTE	= 92
BYTES	= 4
DESCRIPTION	= "Minimum RWA 1 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA1_MAX
DATA_TYPE	= PC_REAL
START_BYTE	= 96
BYTES	= 4
DESCRIPTION	= "Maximum RWA 1 rate during this IFGM "
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= RWA2_MIN
DATA_TYPE	= PC_REAL
START_BYTE	= 100
BYTES	= 4
DESCRIPTION	= "Minimum RWA 2 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA2_MAX
DATA_TYPE	= PC_REAL
START_BYTE	= 104
BYTES	= 4
DESCRIPTION	= "Maximum RWA 2 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA3_MIN
DATA_TYPE	= PC_REAL
START_BYTE	= 108
BYTES	= 4
DESCRIPTION	= "Minimum RWA 3 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA3_MAX
DATA_TYPE	= PC_REAL
START_BYTE	= 112
BYTES	= 4
DESCRIPTION	= "Maximum RWA 3 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA4_MIN
DATA_TYPE	= PC_REAL
START_BYTE	= 116
BYTES	= 4
DESCRIPTION	= "Minimum RWA 4 rate during this IFGM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RWA4_MAX
DATA_TYPE	= PC_REAL
START_BYTE	= 120
BYTES	= 4
DESCRIPTION	= "Maximum RWA 4 rate during this IFGM "
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= RWA_NOISE_FLAG
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 124
BYTES	= 4
DESCRIPTION	= "= 1 if there is a high probability that this IFGM has been adversely affected by one of the wheel rates "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DELTA_RTI_DIFFERENCE
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 128
BYTES	= 4
DESCRIPTION	= "Error between where the FIFM spike pattern is predicted to be located and where it actually is calculated to be located "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= NOISE_DIAGNOSTIC
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 132
BYTES	= 2
DESCRIPTION	= "Additional noise values for each interferogram for diagnostic purposes: 0 - Normal scan. 5555 - FP1 deep-space IFGMs are assigned NOISE_DIAGNOSTIC = 5555 if SPECTRUM_DIAGNOSTIC = 2, 3 or 4. 6666 - All FP1 IFGMs (target and deep-space) are assigned NOISE_DIAGNOSTIC = 6666 if SPECTRUM_DIAGNOSTIC >= 5. 7777 - FP1,FP3, and FP4 shutter-closed IFGMs whose rawpowers are not within the established minima and maxima are assigned NOISE_DIAGNOSTIC = 7777. 8888 - FP1, FP3 and FP4 deep-space IFGMs whose rawpowers are not within the established minima and maxima are assigned NOISE_DIAGNOSTIC = 8888. "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= AMPSINEWAVE
DATA_TYPE	= PC_REAL
START_BYTE	= 134

BYTES	= 4
DESCRIPTION	= "Amplitude in inverse counts of the FP1 sine wave "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= AMP8HZSPIKE
DATA_TYPE	= PC_REAL
START_BYTE	= 138
BYTES	= 4
DESCRIPTION	= "Amplitude in inverse counts of the FP1 8 Hz spike "
END_OBJECT	= COLUMN

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COLUMNS	= 33
ROW_BYTES	= 280
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "SPACECRAFT EVENT TIME, ENCODED AS AN INT "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCLK
DATA_TYPE	= PC_REAL
START_BYTE	= 5
BYTES	= 8
DESCRIPTION	= "SPACECRAFT CLOCK, IN SCLK FORMAT "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PARTITION
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 13
BYTES	= 4
DESCRIPTION	= "SCLK PARTITION "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TIME_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 17
BYTES	= 8

DESCRIPTION	= "TIME OF ZPD "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_ID
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 25
BYTES	= 4
DESCRIPTION	= "NAIF BODY ID "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= EPHEMERIS_TIME
DATA_TYPE	= PC_REAL
START_BYTE	= 29
BYTES	= 8
DESCRIPTION	= "EPHEMERIS TIME CORRESPONDING TO THIS SCET "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SPACECRAFT_RANGE
DATA_TYPE	= PC_REAL
START_BYTE	= 37
BYTES	= 8
DESCRIPTION	= "KM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_POSITION
DATA_TYPE	= PC_REAL
START_BYTE	= 45
BYTES	= 24
ITEMS	= 3
ITEM_BYTES	= 8
DESCRIPTION	= "KM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SPACECRAFT_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 69
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SPACECRAFT LONGITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SPACECRAFT_LATITUDE
DATA_TYPE	= PC_REAL

START_BYTE	= 77
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SPACECRAFT LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUN_RANGE
DATA_TYPE	= PC_REAL
START_BYTE	= 85
BYTES	= 8
DESCRIPTION	= "KM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUN_RIGHT_ASCENSION
DATA_TYPE	= PC_REAL
START_BYTE	= 93
BYTES	= 8
DESCRIPTION	= "DEGREES "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUN_DECLINATION
DATA_TYPE	= PC_REAL
START_BYTE	= 101
BYTES	= 8
DESCRIPTION	= "DEGREES "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SOLAR_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 109
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SOLAR LONGITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SOLAR_LATITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 117
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SOLAR LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_PHASE_ANGLE
DATA_TYPE	= PC_REAL

START_BYTE	= 125
BYTES	= 8
DESCRIPTION	= "PLANETARY PHASE ANGLE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_ANGULAR_SEMIDIAMETER
DATA_TYPE	= PC_REAL
START_BYTE	= 133
BYTES	= 8
DESCRIPTION	= "MILLIRADIANS "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_ORBITAL_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 141
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SYS3_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 149
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_ID
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 157
BYTES	= 4
DESCRIPTION	= "NAIF PRIMARY ID "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SPACECRAFT_RANGE
DATA_TYPE	= PC_REAL
START_BYTE	= 161
BYTES	= 8
DESCRIPTION	= "KM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SPACECRAFT_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 169
BYTES	= 8

DESCRIPTION	= "PLANETOGRAPHIC SUB SPACECRAFT LONGITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SPACECRAFT_LATITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 177
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SPACECRAFT LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUN_RANGE
DATA_TYPE	= PC_REAL
START_BYTE	= 185
BYTES	= 8
DESCRIPTION	= "KM "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SOLAR_LONGITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 193
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SOLAR LONGITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SOLAR_LATITUDE
DATA_TYPE	= PC_REAL
START_BYTE	= 201
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SOLAR LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_PHASE_ANGLE
DATA_TYPE	= PC_REAL
START_BYTE	= 209
BYTES	= 8
DESCRIPTION	= "PLANETARY PHASE ANGLE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_ANGULAR_SEMIDIAMETER
DATA_TYPE	= PC_REAL
START_BYTE	= 217
BYTES	= 8

DESCRIPTION	= "MILLIRADIANS "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCET_STRING
DATA_TYPE	= CHARACTER
START_BYTE	= 225
BYTES	= 24
ITEMS	= 24
ITEM_BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SPACECRAFT_LATITUDE_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 249
BYTES	= 8
DESCRIPTION	= "PLANETOCENTRIC SUB SPACECRAFT LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= BODY_SUB_SOLAR_LATITUDE_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 257
BYTES	= 8
DESCRIPTION	= "PLANETOCENTRIC SUB SOLAR LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SPACECRAFT_LATITUDE_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 265
BYTES	= 8
DESCRIPTION	= "PLANETOCENTRIC SUB SPACECRAFT LATITUDE "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_SUB_SOLAR_LATITUDE_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 273
BYTES	= 8
DESCRIPTION	= "PLANETOGRAPHIC SUB SOLAR LATITUDE "
END_OBJECT	= COLUMN

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COLUMNS	= 31
ROW_BYTES	= 1092
OBJECT	= COLUMN
NAME	= TARGET_ID
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "NAIF target ID "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PRIMARY_ID
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 5
BYTES	= 4
DESCRIPTION	= "NAIF ID of the primary"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 9
BYTES	= 4
DESCRIPTION	= "Spacecraft event time encoded as an integer"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TIME_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 13
BYTES	= 8
DESCRIPTION	= "The SCET time of ZPD"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TIME_END
DATA_TYPE	= PC_REAL
START_BYTE	= 21
BYTES	= 8
DESCRIPTION	= "The SCET time at the end of the scan"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DET

DATA_TYPE	= LSB_INTEGER
START_BYTE	= 29
BYTES	= 4
DESCRIPTION	= "DETECTOR ID "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ALL_Q_ON
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 33
BYTES	= 4
DESCRIPTION	= "Boolean, 1 if all 9 Q points are on the target, 0 if 1 or more is off "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LATITUDE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 37
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Planetographic latitude at ZPD, all Q points, degrees north"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LONGITUDE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 109
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Longitude at ZPD, all Q points, degrees west"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ALTITUDE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 181
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Altitude of ray periapses, in km, all Q points"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= RIGHT_ASCENSION
DATA_TYPE	= PC_REAL
START_BYTE	= 253
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Right ascension of the Q point rays at TIME_ZPD, degrees, J2000 coordinate system"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= DECLINATION
DATA_TYPE	= PC_REAL
START_BYTE	= 325
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Declination of the Q point rays at TIME_ZPD, degrees, J2000 coordinate system"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= SPACECRAFT_TO_IMAGE_POINT_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 397
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "The distance in km along the Q points to either the surface of the target or the ray periapsis"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= LATITUDE_END
DATA_TYPE	= PC_REAL
START_BYTE	= 469
BYTES	= 8
DESCRIPTION	= "The planetographic latitude, in degrees north, of the boresight (Q point 5) at TIME_END"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= LONGITUDE_END
DATA_TYPE	= PC_REAL
START_BYTE	= 477

BYTES	= 8
DESCRIPTION	= "The longitude, in degrees west, of the boresight (Q point 5) at TIME_END"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ALTITUDE_END
DATA_TYPE	= PC_REAL
START_BYTE	= 485
BYTES	= 8
DESCRIPTION	= "The altitude in km of the boresight (Q point 5) at TIME_END"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SMEAR
DATA_TYPE	= PC_REAL
START_BYTE	= 493
BYTES	= 8
DESCRIPTION	= "The fraction of the field of view that the original intersection point of the boresight has moved between TIME ZPD and TIME END"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= EMISSION_ANGLE
DATA_TYPE	= PC_REAL
START_BYTE	= 501
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Angle in degrees between the normal at the point on the surface at which the Q point intersects and the spacecraft direction vector"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= EMISSION_ANGLE_FOV_AVERAGE
DATA_TYPE	= PC_REAL
START_BYTE	= 573
BYTES	= 8
DESCRIPTION	= "An average of the values of the emission angle over the field of view"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= FILLING_FACTOR
DATA_TYPE	= PC_REAL
START_BYTE	= 581
BYTES	= 8
DESCRIPTION	= "The fraction of the FOV filled by the target"
END_OBJECT	= COLUMN
 OBJECT	 = COLUMN
NAME	= EMISSION_AZIMUTH_ANGLE
DATA_TYPE	= PC_REAL
START_BYTE	= 589
BYTES	= 8
DESCRIPTION	= "Projection of the spacecraft position vector on the surface of the target and north, in degrees, for the boresight ray"
END_OBJECT	= COLUMN
 OBJECT	 = COLUMN
NAME	= SOLAR_ZENITH
DATA_TYPE	= PC_REAL
START_BYTE	= 597
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Angle between the direction vector of the Sun and the normal to the surface at which the Q point intersects the surface, in degrees"
END_OBJECT	= COLUMN
 OBJECT	 = COLUMN
NAME	= SOLAR_AZIMUTH
DATA_TYPE	= PC_REAL
START_BYTE	= 669
BYTES	= 8
DESCRIPTION	= "Angle, for the boresight only (Q point 5), between the projection of the direction vector of the Sun and north on the surface of the target, in degrees"
END_OBJECT	= COLUMN
 OBJECT	 = COLUMN
NAME	= SOLAR_PHASE
DATA_TYPE	= PC_REAL
START_BYTE	= 677
BYTES	= 8

DESCRIPTION	= "Angle, for the boresight only (Q point 5), between the Sun and the boresight at the point at which the boresight intersects the target, in degrees"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LOCAL_TIME
DATA_TYPE	= PC_REAL
START_BYTE	= 685
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "The local solar time for each Q point"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ZLIMB
DATA_TYPE	= PC_REAL
START_BYTE	= 757
BYTES	= 8
DESCRIPTION	= "Angle between the instrument +Y axis and the surface normal, in degrees"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SPACECRAFT_BODY_FIXED
DATA_TYPE	= PC_REAL
START_BYTE	= 765
BYTES	= 24
ITEMS	= 3
ITEM_BYTES	= 8
DESCRIPTION	= "Spacecraft location in body fixed coordinates"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FOV_BODY_FIXED
DATA_TYPE	= PC_REAL
START_BYTE	= 789
BYTES	= 216
ITEMS	= 27
ITEM_BYTES	= 8
DESCRIPTION	= "Q point unit vectors in body fixed coordinates"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= Z
DATA_TYPE	= PC_REAL

START_BYTE	= 1005
BYTES	= 8
DESCRIPTION	= "Velocity along the line of sight divided by the speed of light"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LATITUDE_ZPD_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 1013
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "Planetocentric latitude at ZPD, all Q points, in degrees north"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LATITUDE_END_PC
DATA_TYPE	= PC_REAL
START_BYTE	= 1085
BYTES	= 8
DESCRIPTION	= "Planetocentric latitude, at TIME_END, for the boresight (Q point 5), in degrees north."
END_OBJECT	= COLUMN

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COLUMNS	= 18
ROW_BYTES	= 644
OBJECT	= COLUMN
NAME	= PRIMARY_ID
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "NAIF ID OF THE PRIMARY "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 5
BYTES	= 4

DESCRIPTION	= "SPACECRAFT EVENT TIME ENCODED AS AN INTEGER"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TIME_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 9
BYTES	= 8
DESCRIPTION	= "TIME ZPD "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TIME_END
DATA_TYPE	= PC_REAL
START_BYTE	= 17
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 25
BYTES	= 4
DESCRIPTION	= "DETECTOR ID "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_RADIUS_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 29
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "RADIUS OF INTERCEPT "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SPACECRAFT_RANGE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 101
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
DESCRIPTION	= "DISTANCE OF SPACECRAFT FROM RING INTERCEPT "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_EMISSION_AZIMUTH_ANGLE

DATA_TYPE	= PC_REAL
START_BYTE	= 173
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SOLAR_PHASE
DATA_TYPE	= PC_REAL
START_BYTE	= 245
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_EMISSION_ANGLE
DATA_TYPE	= PC_REAL
START_BYTE	= 317
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_LONGITUDE_ZPD
DATA_TYPE	= PC_REAL
START_BYTE	= 389
ITEMS	= 9
BYTES	= 72
ITEM_BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SOLAR_AZIMUTH
DATA_TYPE	= PC_REAL
START_BYTE	= 461
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SOLAR_ZENITH
DATA_TYPE	= PC_REAL
START_BYTE	= 469
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8

END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_LONGITUDE_END
DATA_TYPE	= PC_REAL
START_BYTE	= 541
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_RADIUS_END
DATA_TYPE	= PC_REAL
START_BYTE	= 549
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SPACECRAFT_RANGE_END
DATA_TYPE	= PC_REAL
START_BYTE	= 557
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_SMEAR
DATA_TYPE	= PC_REAL
START_BYTE	= 565
BYTES	= 8
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RING_LOCAL_TIME
DATA_TYPE	= PC_REAL
START_BYTE	= 573
BYTES	= 72
ITEMS	= 9
ITEM_BYTES	= 8
END_OBJECT	= COLUMN

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COLUMNS	= 36
ROW_BYTES	= 45
OBJECT	= COLUMN
NAME	= SCET

DATA_TYPE	=	LSB_INTEGER
START_BYTE	=	1
BYTES	=	4
DESCRIPTION	=	"spacecraft event time encoded as an integer "
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	DET
DATA_TYPE	=	LSB_INTEGER
START_BYTE	=	5
BYTES	=	4
DESCRIPTION	=	"detector ID "
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	FOV_TARGETS
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	9
BYTES	=	4
DESCRIPTION	=	"A bitfield, with the following assignments:

2^0	Jupiter ring
2^1	Jupiter
2^2	Io
2^3	Europa
2^4	Ganymede
2^5	Callisto
2^6	Saturn
2^7	Mimas
2^8	Enceladus
2^9	Tethys
2^10	Dione
2^11	Rhea
2^12	Titan
2^13	Hyperion
2^14	Iapetus
2^15	Phoebe
2^16	Janus
2^17	Epimetheus
2^18	Helene
2^19	Telesto
2^20	Calypso
2^21	Atlas
2^22	Prometheus
2^23	Pandora
2^24	Pan
2^25	Saturn ring

2²⁶ Methone
 2²⁷ Daphnis
 2²⁸ Pallene
 2²⁹ Polydeuces
 2³⁰ Aegaeon
 2³¹ A stellar target from the 'stars' file

If the corresponding bit is on, the object is in the field of view, otherwise it isn't. "

END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = JRING
 DATA_TYPE = LSB_UNSIGNED_INTEGER
 START_BYTE = 13
 BYTES = 1
 END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = JUPITER
 DATA_TYPE = LSB_UNSIGNED_INTEGER
 START_BYTE = 14
 BYTES = 1
 END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = IO
 DATA_TYPE = LSB_UNSIGNED_INTEGER
 START_BYTE = 15
 BYTES = 1
 END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = EUROPA
 DATA_TYPE = LSB_UNSIGNED_INTEGER
 START_BYTE = 16
 BYTES = 1
 END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = GANYMEDE
 DATA_TYPE = LSB_UNSIGNED_INTEGER
 START_BYTE = 17
 BYTES = 1
 END_OBJECT = COLUMN

OBJECT = COLUMN
 NAME = CALLISTO
 DATA_TYPE = LSB_UNSIGNED_INTEGER

START_BYTE	= 18
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SATURN
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 19
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= MIMAS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 20
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ENCELADUS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 21
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TETHYS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 22
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIONE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 23
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RHEA
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 24
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TITAN

DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	25
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	HYPERION
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	26
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	IAPETUS
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	27
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	PHOEBE
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	28
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	JANUS
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	29
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	EPIMETHEUS
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	30
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	HELENE
DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	31
BYTES	=	1
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN

NAME	= TELESTO
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 32
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALYPSO
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 33
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ATLAS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 34
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PROMETHEUS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 35
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PANDORA
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 36
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PAN
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 37
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= METHONE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 38
BYTES	= 1
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= DAPHNIS
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 39
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PALLENE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 40
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= POLYDEUCES
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 41
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= AEGAEON
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 42
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SRING
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 43
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DEEP_SPACE
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 44
BYTES	= 1
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= STELLAR
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 45
BYTES	= 1
END_OBJECT	= COLUMN

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COLUMNS	= 42
ROW_BYTES	= 149
OBJECT	= COLUMN
NAME	= SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 1
BYTES	= 4
DESCRIPTION	= "spacecraft clock time "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 5
BYTES	= 1
DESCRIPTION	= "detector number "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_NAV
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 6
BYTES	= 2
DESCRIPTION	= "number of spectra in deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_NAV
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 8
BYTES	= 2
DESCRIPTION	= "number of spectra in shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 10
BYTES	= 4
DESCRIPTION	= "instrument temperature in calibration (K)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TDET

DATA_TYPE	= PC_REAL
START_BYTE	= 14
BYTES	= 4
DESCRIPTION	= "temperature of detector"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FPASET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 18
BYTES	= 2
DESCRIPTION	= "pseudo set point based on FPA temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 20
BYTES	= 4
DESCRIPTION	= "instrument temperature in calibration (K) for the deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TDET
DATA_TYPE	= PC_REAL
START_BYTE	= 24
BYTES	= 4
DESCRIPTION	= "temperature of detector for the deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 28
BYTES	= 4
DESCRIPTION	= "instrument temperature in calibration (K) for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TDET
DATA_TYPE	= PC_REAL
START_BYTE	= 32
BYTES	= 4
DESCRIPTION	= "temperature of detector for the shutter average"

END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IWN_START
DATA_TYPE	= PC_REAL
START_BYTE	= 36
BYTES	= 4
DESCRIPTION	= "wavenumber of first regridded spectral point (cm-1)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IWN_STEP
DATA_TYPE	= PC_REAL
START_BYTE	= 40
BYTES	= 4
DESCRIPTION	= "wavenumber step size of regridded data (cm-1)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= APODTYPE
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 44
BYTES	= 2
DESCRIPTION	= "numeric type of apodisation function"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FWHM
DATA_TYPE	= PC_REAL
START_BYTE	= 46
BYTES	= 4
DESCRIPTION	= "FWHM of instrument line shape (cm-1)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RAYLEIGH
DATA_TYPE	= PC_REAL
START_BYTE	= 50
BYTES	= 4
DESCRIPTION	= "Rayleigh resol. (= dist to first null of ILS) in cm-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= NYQUIST
DATA_TYPE	= PC_REAL

START_BYTE	= 54
BYTES	= 4
DESCRIPTION	= "Nyquist bin size (intrinsic resol. limit) in cm-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= POWER
DATA_TYPE	= PC_REAL
START_BYTE	= 58
BYTES	= 4
DESCRIPTION	= "integrated radiance under the spectrum in W cm-2 sr-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 62
BYTES	= 4
DESCRIPTION	= "Deep Space SCET "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_SH_SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 66
BYTES	= 4
DESCRIPTION	= "Deep Space Shutter Closed SCET "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CTZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 70
BYTES	= 4
DESCRIPTION	= "position of the minimum zpd peak"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CTZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 74
BYTES	= 4
DESCRIPTION	= "position of the maximum zpd peak"
END_OBJECT	= COLUMN
OBJECT	= COLUMN

NAME	= PHASE_SHIFT
DATA_TYPE	= PC_REAL
START_BYTE	= 78
BYTES	= 4
DESCRIPTION	= "phase shift correction applied during calibration"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASE_SHIFT_FLAG
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 82
BYTES	= 1
DESCRIPTION	= "1 if phase shift correction encountered a problem, 0 otherwise"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASE_SHIFT_ERROR
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 83
BYTES	= 1
DESCRIPTION	= "Sum of PHASE_SHIFT_FLAG across all detectors."
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 84
BYTES	= 4
DESCRIPTION	= "position of the minimum zpd peak for the deep-space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 88
BYTES	= 4
DESCRIPTION	= "position of the maximum zpd peak for the deep-space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DS_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 92

BYTES	= 4
DESCRIPTION	= "difference between CTZP1 and DS_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DS_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 96
BYTES	= 4
DESCRIPTION	= "difference between CTZP2 and DS_TZPD2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 100
BYTES	= 4
DESCRIPTION	= "position of the minimum zpd peak for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 104
BYTES	= 4
DESCRIPTION	= "position of the maximum zpd peak for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_SH_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 108
BYTES	= 4
DESCRIPTION	= "difference between CTZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_SH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 112
BYTES	= 4
DESCRIPTION	= "difference between CTZP2 and SH_TZPD2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DSSH_TZPD1

DATA_TYPE	= PC_REAL
START_BYTE	= 116
BYTES	= 4
DESCRIPTION	= "difference between DS_TZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DSSH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 120
BYTES	= 4
DESCRIPTION	= "difference between DS_TZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE1
DATA_TYPE	= PC_REAL
START_BYTE	= 124
BYTES	= 4
DESCRIPTION	= "calibration score1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE2
DATA_TYPE	= PC_REAL
START_BYTE	= 128
BYTES	= 4
DESCRIPTION	= "calibration score2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE3
DATA_TYPE	= PC_REAL
START_BYTE	= 132
BYTES	= 4
DESCRIPTION	= "calibration score3"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE4
DATA_TYPE	= PC_REAL
START_BYTE	= 136
BYTES	= 4
DESCRIPTION	= "calibration score4"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LASER_WL

```

        DATA_TYPE          = PC_REAL
        START_BYTE          = 140
        BYTES                = 4
        DESCRIPTION          = "assumed reference interferometer laser
                               wavelength"
    END_OBJECT              = COLUMN

    OBJECT                  = COLUMN
        NAME                 = ISPTS
        DATA_TYPE           = LSB_INTEGER
        START_BYTE           = 144
        BYTES                 = 2
        DESCRIPTION          = "number of points in regridded spectrum"
    END_OBJECT              = COLUMN

    OBJECT                  = COLUMN
        NAME                 = ISPM
        DATA_TYPE           = LSB_INTEGER
        START_BYTE           = 146
        BYTES                 = 4
        VAR_DATA_TYPE        = PC_REAL
        VAR_ITEM_BYTES       = 4
        VAR_RECORD_TYPE      = VAX_VARIABLE_LENGTH
        DESCRIPTION          = "pointer to regridded spectra data. Spectra
                               data has units W cm-2 sr-1 (cm-1)-1"
    END_OBJECT              = COLUMN

```

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```

COLUMNS                  = 42
ROW_BYTES                 = 149

    OBJECT                  = COLUMN
        NAME                 = SCET
        DATA_TYPE           = LSB_UNSIGNED_INTEGER
        START_BYTE           = 1
        BYTES                 = 4
        DESCRIPTION          = "spacecraft clock time "
    END_OBJECT              = COLUMN

    OBJECT                  = COLUMN
        NAME                 = DET
        DATA_TYPE           = LSB_INTEGER
        START_BYTE           = 5
        BYTES                 = 1

```

DESCRIPTION	= "detector number "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_NAVG
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 6
BYTES	= 2
DESCRIPTION	= "number of spectra in deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_NAVG
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 8
BYTES	= 2
DESCRIPTION	= "number of spectra in shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 10
BYTES	= 4
DESCRIPTION	= "instrument temperature in calibration (K)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= TDET
DATA_TYPE	= PC_REAL
START_BYTE	= 14
BYTES	= 4
DESCRIPTION	= "temperature of detector"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FPASET
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 18
BYTES	= 2
DESCRIPTION	= "pseudo set point based on FPA temperature"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 20
BYTES	= 4

DESCRIPTION	= "instrument temperature in calibration (K) for the deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_TDET
DATA_TYPE	= PC_REAL
START_BYTE	= 24
BYTES	= 4
DESCRIPTION	= "temperature of detector for the deep space average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TINSTR
DATA_TYPE	= PC_REAL
START_BYTE	= 28
BYTES	= 4
DESCRIPTION	= "instrument temperature in calibration (K) for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TDET
DATA_TYPE	= PC_REAL
START_BYTE	= 32
BYTES	= 4
DESCRIPTION	= "temperature of detector for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IWN_START
DATA_TYPE	= PC_REAL
START_BYTE	= 36
BYTES	= 4
DESCRIPTION	= "wavenumber of first regridded spectral point (cm-1)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= IWN_STEP
DATA_TYPE	= PC_REAL
START_BYTE	= 40
BYTES	= 4
DESCRIPTION	= "wavenumber step size of regridded data (cm-1)"
END_OBJECT	= COLUMN

OBJECT	= COLUMN
NAME	= APODTYPE
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 44
BYTES	= 2
DESCRIPTION	= "numeric type of apodisation function"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= FWHM
DATA_TYPE	= PC_REAL
START_BYTE	= 46
BYTES	= 4
DESCRIPTION	= "FWHM of instrument line shape (cm-1)"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= RAYLEIGH
DATA_TYPE	= PC_REAL
START_BYTE	= 50
BYTES	= 4
DESCRIPTION	= "Rayleigh resol. (= dist to first null of ILS) in cm-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= NYQUIST
DATA_TYPE	= PC_REAL
START_BYTE	= 54
BYTES	= 4
DESCRIPTION	= "Nyquist bin size (intrinsic resol. limit) in cm-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= POWER
DATA_TYPE	= PC_REAL
START_BYTE	= 58
BYTES	= 4
DESCRIPTION	= "integrated radiance under the spectrum in W cm-2 sr-1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 62

BYTES	= 4
DESCRIPTION	= "Deep Space SCET "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DS_SH_SCET
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 66
BYTES	= 4
DESCRIPTION	= "Deep Space Shutter Closed SCET "
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CTZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 70
BYTES	= 4
DESCRIPTION	= "position of the minimum zpd peak"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CTZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 74
BYTES	= 4
DESCRIPTION	= "position of the maximum zpd peak"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASE_SHIFT
DATA_TYPE	= PC_REAL
START_BYTE	= 78
BYTES	= 4
DESCRIPTION	= "phase shift correction applied during calibration"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASE_SHIFT_FLAG
DATA_TYPE	= LSB_UNSIGNED_INTEGER
START_BYTE	= 82
BYTES	= 1
DESCRIPTION	= "1 if phase shift correction encountered a problem, 0 otherwise"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= PHASE_SHIFT_ERROR

DATA_TYPE	=	LSB_UNSIGNED_INTEGER
START_BYTE	=	83
BYTES	=	1
DESCRIPTION	=	"Sum of PHASE_SHIFT_FLAG across all detectors."
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	DS_TZPD1
DATA_TYPE	=	PC_REAL
START_BYTE	=	84
BYTES	=	4
DESCRIPTION	=	"position of the minimum zpd peak for the deep-space average"
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	DS_TZPD2
DATA_TYPE	=	PC_REAL
START_BYTE	=	88
BYTES	=	4
DESCRIPTION	=	"position of the maximum zpd peak for the deep-space average"
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	DIST_DS_TZPD1
DATA_TYPE	=	PC_REAL
START_BYTE	=	92
BYTES	=	4
DESCRIPTION	=	"difference between CTZP1 and DS_TZPD1"
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	DIST_DS_TZPD2
DATA_TYPE	=	PC_REAL
START_BYTE	=	96
BYTES	=	4
DESCRIPTION	=	"difference between CTZP2 and DS_TZPD2"
END_OBJECT	=	COLUMN
OBJECT	=	COLUMN
NAME	=	SH_TZPD1
DATA_TYPE	=	PC_REAL
START_BYTE	=	100
BYTES	=	4
DESCRIPTION	=	"position of the minimum zpd peak for the shutter average"

END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= SH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 104
BYTES	= 4
DESCRIPTION	= "position of the maximum zpd peak for the shutter average"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_SH_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 108
BYTES	= 4
DESCRIPTION	= "difference between CTZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_SH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 112
BYTES	= 4
DESCRIPTION	= "difference between CTZP2 and SH_TZPD2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DSSH_TZPD1
DATA_TYPE	= PC_REAL
START_BYTE	= 116
BYTES	= 4
DESCRIPTION	= "difference between DS_TZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= DIST_DSSH_TZPD2
DATA_TYPE	= PC_REAL
START_BYTE	= 120
BYTES	= 4
DESCRIPTION	= "difference between DS_TZP1 and SH_TZPD1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE1
DATA_TYPE	= PC_REAL
START_BYTE	= 124
BYTES	= 4

DESCRIPTION	= "calibration score1"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE2
DATA_TYPE	= PC_REAL
START_BYTE	= 128
BYTES	= 4
DESCRIPTION	= "calibration score2"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE3
DATA_TYPE	= PC_REAL
START_BYTE	= 132
BYTES	= 4
DESCRIPTION	= "calibration score3"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= CALIB_SCORE4
DATA_TYPE	= PC_REAL
START_BYTE	= 136
BYTES	= 4
DESCRIPTION	= "calibration score4"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= LASER_WL
DATA_TYPE	= PC_REAL
START_BYTE	= 140
BYTES	= 4
DESCRIPTION	= "assumed reference interferometer laser wavelength"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= ISPTS
DATA_TYPE	= LSB_INTEGER
START_BYTE	= 144
BYTES	= 2
DESCRIPTION	= "number of points in regridded spectrum"
END_OBJECT	= COLUMN
OBJECT	= COLUMN
NAME	= OISPM
DATA_TYPE	= LSB_INTEGER

START_BYTE	= 146
BYTES	= 4
ALIAS_NAME	= ISPM
VAR_DATA_TYPE	= PC_REAL
VAR_ITEM_BYTES	= 4
VAR_RECORD_TYPE	= VAX_VARIABLE_LENGTH
DESCRIPTION	= "pointer to regridded spectra data. Spectra data has units W cm-2 sr-1 (cm-1)-1"
END_OBJECT	= COLUMN