Max-Planck-Institut für
Sonnensystemforschung

Rosetta-COSAC

To Planetary Science Archive Interface Control Document

RLGS-SPEC-SONC_DPS-SCIE-9049-CNE

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TBD ITEMS

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3.4.3.6	Geometry directory
3.4.3.4.2	Geometric Index File

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1 Introduction

1.1 Purpose and Scope

The purpose of this EAICD (Experimenter to (Science) Archive Interface Control Document) is two fold. First it provides users of the COSAC instrument with detailed description of the product and a description of how it was generated, including data sources and destinations. Secondly, it is the official interface between COSAC and PSA.

1.2 Archiving Authorities

The Planetary Data System Standard is used as archiving standard by

- NASA for U.S. planetary missions, implemented by PDS
- ESA for European planetary missions, implemented by the Research and Scientific Support Department (RSSD) of ESA

ESA's Planetary Science Archive (PSA)

ESA implements an online science archive, the PSA,

- to support and ease data ingestion
- to offer additional services to the scientific user community and science operations teams as e.g.
    - search queries that allow searches across instruments, missions and scientific disciplines
    - several data delivery options as
        - direct download of data products, linked files and data sets
        - ftp download of data products, linked files and data sets

The PSA aims for online ingestion of logical archive volumes and offers the creation of physical archive volumes on request.

1.3 Contents

This document describes the data flow of the COSAC instrument on Rosetta from the s/c until the insertion into the PSA for ESA. It includes information on how data were processed, formatted, labeled and uniquely identified. The document discusses general naming schemes for data volumes, data sets, data and label files. Standards used to generate the product are explained. Software that may be used to access the product is explained further on.

The design of the data set structure and the data product is given. Examples of these are given in the appendix.

1.4 Intended Readership

The staff of the archiving authority (Planetary Science Archive, ESA, RSSD, design team) and any potential user of the COSAC data.

1.5 Scientific Objectives

1.6 Applicable Documents

AD 1. Planetary Data System Preparation Workbook, February 17, 1995, Version 3.1, JPL, D-7669, Part1
AD 2. Planetary Data System Standards Reference, August 1, 2003, Version 3.6, JPL, D-7669, Part2
AD 3. CDMS Subsystem & Instruments Electrical Interface Definition (Extract from REID-A) and Generic Payload Control.
AD 4. CDMS Command and Data Management System - Subsystem Specification RO-LCD-SP-3101 29/08/2001, Issue 3, Rev. 5
AD 5. CDMS Command and Data Management System - Operation Manual RO-LCD-SW-3402 12/02/2001, Issue 1, Rev. 2
AD 6. Rosetta Time handling RO-EST-TN-3165, issue 1 rev 0, February 9, 2004
AD 7. DDID- Data Delivery Interface Document RO-ESC-IF-5003 Issue B6 23/10/2003
AD 8. ROSETTA Archive Generation, Validation and Transfer Plan, January 10, 2006, Issue 2, Rev. 3, RO-EST-PL-5011
AD 9. COSAC Software Interface Description, RO-LCO-IF-340001, 05 December 2005, Issue 1, Rev. 13.
AD 10. COSAC Software Interface Description, RO-LCO-IF-340001, 18 June 2009, Issue 3, Rev. 0.
AD 11. CDMS DDD, RO-LCD-SW-3610, Issue 6 and above
AD 12. ROSETTA Archive Conventions RO-EST-TN-3372 Issue 5, Rev. 6, 25 March 2010

1.7 Relationships to Other Interfaces

No products, software and documents would be affected by a change in this EAICD.

1.8 Acronyms and Abbreviations

CDMS	Command and Data Management System
COSAC	COmetary SAmpling and Composition
DDS	Data Disposition System
DECW	Data Error Control Word
EGSE	Electrical & Electronic Ground Support Equipment
ESS	Electrical Support System
ESTEC	European Space Research and Technology Centre
FM	Flight Model
FS	Flight Spare
GRM	Ground Reference Model
HK	Housekeeping
LOBT	Lander On Board Time
OBT	On Board Time
OBDH	On Board Data Handling
OOBT	Orbiter On Board Time

PDS	Planetary Data System
PECW	Packet Error Control Word
PID	Process Identifier
PSA	Planetary Science Archive
QM	Qualification Model
RF	Radio Frequency
SC	Science
SCET	Spacecraft Event Time
SD2	Sample Drill & Distribution System
SSIF	Subsystem Interface
SFDU	Standard Formatted Data Unit
SONC	Science Operations and Navigation Center (CNES-Toulouse)
TBC	To Be Confirmed
UTC	Universal Time Coordinated

1.9 Contact Names and Addresses

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2 Overview of Instrument Design, Data Handling Process and Product Generation

The COSAC experiment hardware may be structured into a pyrolytic section, a gas-chromatograph, a mass spectrometer, a manifold and gas supply system, and a unit for control, data handling, and housekeeping.

The pyrolytic section
Central to the pyrolytic section are the ovens. These are cylindrical containers made of platinum with a volume of 3 mm diameter and 5 mm height, which are mounted on the carrousel of the SD² sample distribution system. Two types of ovens are available. The medium temperature ovens are designed for temperatures up to 180℃. This type of oven is equipped with an optical window to allow inspection and infrared imaging spectroscopy of the samples by the CIVA microscopic camera. The high temperature ovens have no window and can be heated up to 600℃. Each oven has its own wound-on Platinum heating filament and a Chromel-Alumel thermo-couple for temperature measurement. For gas generation, the oven is heated stepwise to temperature levels selected by telecommand. At each of the 64 levels between -100oC and +600oC analyses can be performed. The normal temperature range in which all combinations of instruments can be used is, however, limited to -100oC to +180oC. The ovens are filled by the sampling device (SD²) which stuffs the material in and measures the filling

height. Then, the filled oven is moved to the COSAC "Tapping Station" which, upon command, presses a ceramic sphere onto the rim of the oven such that gas-tight sealing is accomplished.

The COSAC Tapping Station is a twin device for two neighbouring ovens. The main terminal is connected to the GC via a stainless steel pipe penetrating the sealing ceramic sphere while the side terminal is connected to the MS in the same manner. The Tapping Station also provides the electrical contacts to the ovens which are required for heating and temperature control.

The gas chromatograph (GC)
Gas chromatography is a well-established, wide spread, and powerful method for chemical analysis of volatile organic compounds. It is based on a physical principle, namely that the affinity between a solid or fluid surface ("stationary phase") and a gaseous substance is characteristic for each combination of stationary phase and gas. The gas sample to be analyzed is injected into a gas ("carrier gas") streaming through a capillary tube coated on the inside with a selected stationary phase. This "packet" of gas containing different molecular species separates into its different chemical components during the journey through the capillary tube because some species rest longer on the stationary phase than others. In COSAC, the arrival of a packet at the exit of the capillary is registered by using the effect that it alters the heat conductivity of the carrier gas. One of the advantages of gas chromatography coupled with thermal conductivity detectors besides its simplicity is that the sample molecules are not destroyed and can subsequently be subjected to mass spectroscopic analysis.
The COSAC gas-chromatography unit consists of eight principally identical units. Each of them comprises a gas injector, a capillary column of 10 - 15 m length and 0.15 – 0.25 mm ID, and a thermal conductivity detector. The capillaries are wound to 100 mm ID (inner diameter) spools in parallel with resistive wires for heating. Each spool is compacted by heat resistive glue to form a self-supporting structure. The temperature of the columns can be set by telecommand, the default temperature being 30°C as for the whole GC piping system.

The time of flight (TOF) mass spectrometer (MS)
The MS is a high-resolution TOF instrument, with an electron-impact ionization source, a multi-sphere-plate secondary electron multiplier as detector and a time-to-digital converter (TDC) for signal and flight time registration. The instrument is of the linear reflectron-type with the ion source at one and the detector at the other end. For determining an m/q spectrum, all ions inside the source are accelerated into the flight path with principally the same energy. Therefore heavy ions travel slower than light ones. In the low resolution mode, only the single flight path of approximately 370 mm from the source to the detector is used. In this case, the M/D M FWHM is 350 for ions of mass 70. For achieving a higher mass resolving power, the MS can be used in the multi-turn mode. This mode is possible due to two gridless reflectors, one at the source side and the other at the detector side

Ion source and ion acceleration
An electron impact "storage" ion source is employed. Three thermal electron emitters can be used alternatively thus providing redundancy. The electron flux can be varied by telecommand. The storage capability allows to produce ions for ~ 200 m s while the release pulse is only ~ 1 m s. The ions are accelerated to 1500 eV at the source. Ion pulse are released with 1 KHz repetition rate (4 KHz optimal). The ion travel gate time of 1 ms is more than sufficient to cover the envisaged mass range of 12 to 1500 AMU, even in modes with a high number of passes.

Amplifier, detector and signal registration
The ions are post-accelerated in front of the detector to 4 keV to be registered with high probability in the multi-sphere-plate electron multiplier. An output signal is normally produced by a single ion. The time of the output signal of the amplifier is recorded with a resolution of 2 ns. This time resolution is realized by means of a 33 MHz clock, in connection with a switchable digital delay line of sixteen 2 ns elements. The time of the signal is transmitted to a fast FIFO memory. The FIFO can be read out asynchronously during the measurement. The times are then transmitted to another memory which serves also for spectrum integration. Usually, the measurements are repeated 216 times. That means that 65536 mass spectra are taken in approximately 1 minute. Resolution enhancement is possible by starting every other spectrum with 1 ns delay.

Manifold and gas system
The manifold is a system of pipes, valves, pressure detectors, and pressure regulators mainly required for the gas chromatograph (GC). The manifold controls the flow of the evolved gas from the oven to the GC, and distributes the carrier gas (Helium) and the calibration gas. The calibration gas, a mixture of four noble gases (He, Ne, Ar, Kr), is used to optimize the mass spectrometer performance by fine-tuning of voltages, to calibrate the time of flight mass spectrometer and to check the GC health status and retention times. The manifold also includes a "split" to feed the gas from the GC detectors to the MS ion source at a suitable pressure. All of the gas routing and switching as well as the seizing of the samples to be injected is accomplished by on/off valves. These valves are electrostatically operated micro valves, with practically zero power consumption.
The carrier gas Helium is stored in two 330 cm3 tanks at 30 bar. The calibration gas is contained in a 25 cm3 tank at 1 bar. Thermally operated valves are employed for pressure regulation of the carrier gas and the calibration gas. These valves are open when heated. At closed position, the gas flow is undetectably low (< 10-11 mbar l/s). Therefore this type of valve is also used to seal the gas tanks. One carrier gas tank is in addition equipped with a single-shot valve for redundant sealing (during cruise).

Control and data handling unit
The instrument communicates with the control and data management system (CDMS) of Philae through a DPU board including a Harris RTX 2010 processor, a PROM, an EEPROM, a SRAM, and additional controllers. This board is housed inside the ROSETTA Lander Common Electronic Box. The data flow between the processor and the instrument is routed through an additional interface board which also hosts the mass memory of 3Mx16 bit, sufficient for storing the data collected during a measurement sequence in GC / MS coupling mode.
Most of the control logics is realized in a group of four Field Programmable Gate Arrays (FPGAs). In addition the FPGAs control of the pyrolytic unit, the high voltages, the ion source, the time to digital converter, the MS spectrum accumulation, and the main activities of the GC unit including heater, valve, injector switching and data registration.
The software controlling the experiment is written in FORTH, the native programming language of the Harris RTX 2010, to take full advantage of the processor's internal stack-based structure.
The main tasks of the software are:
control of the experiment during measurement cycles
data formatting and pre-processing
in-flight calibration
collection of housekeeping data
handling of data communication to and from the CDMS
data compression
The algorithms for controlling of the different measurement cycles are part of the flight software stored in the DPU's EEPROM. Several telecommands (TCs) were defined for uploading of new parameters for the fine-tuning of these onboard algorithms prior to measurements. Additional TCs are available for software maintenance tasks and debugging in case of a non-nominal behaviour.

2.1 Scientific Objectives

The main field the COSAC instrument is specially designed for, is the chemical composition of volatiles in the cometary matter. Special emphasis is put on the identification of organic molecules with high molecular mass numbers. Such molecules are of special interest to the COSAC team because they might be the "pre-biotic" building blocks of life on Earth and other planets.

2.2 Data Handling Process

The SONC is responsible for COSAC data sets generation and delivery to the PSA.

The COSAC telemetry data is provided by the ESA DDS (Data Distribution Server). Following the operations plan the SONC pulls out archived packets (SC and HK) by direct request to the DDS via

FTP and stores them into SONC database.
The raw data are passed through the SONC data processing software for decommutation, conversion to physical values and calibration. The calibrated data are also stored into SONC database.

Science (SC) and Housekeeping (HK) raw data are available through W3-SONC server (http://sonc-rosetta.cnes.fr) and the authorized users can get them for a selected time interval as binary files with .rolbin extension.
To read and to understand the raw data the user shall refer to AD 9 and AD 3, and use the software developed to display the raw data in a readable way.
The software called COSAC-EGSE is the software developed to visualize the raw data.

SC data are available through W3-SONC server (http://sonc-rosetta.cnes.fr) and authorized users can get refined data for a selected time interval as ASCII files with .spr extension (directly readable).
Calibrated HK data are available through W3-SONC for a selected time interval as ASCII files with .csv extension (directly readable).

The W3-SONC provides interactive plots of COSAC data (housekeeping & science data).

After the proprietary period, the SONC team provides the raw data, refined data and plots to the ESA–PDS team.
The delivery format is described in this document.

2.3 Overview of Data Products

2.3.1 Pre-Flight Data Products

Some selected ground data are available. The delivered file contains last ground data produced by the flight hardware that were recorded prior to delivery to ESTEC in July 2002. There are :

Two GC-MS runs:
Each of them 3 min, performed without a sample. The idea was to verify the operation of the instrument without contaminating it.

17 MS spectra:
Spectra 0-6 contain calibration gas (a mixture of all stable noble gasses) measured in low resolution.
Spectra 7 and 8 are empty.
Spectra 9-12 contain data used to verify the multi-reflection mode (difficult to interpret).
Spectra 13-16 contain data with calibration gas measured in high resolution mode.

2.3.2 Instrument Calibrations

The file COSAC_CALIBRATION_DESC.TXT (located in the DOCUMENT directory) provides information about Instrument calibration.

There are no calibration data archived.

2.3.3 In-Flight Data Products

The in-flight data correspond to all the on board data.
They can be produced during following mission phases :

MISSION_PHASE_NAME	Abbreviation	Start Date (dd/mm/yyyy)	End Date (dd/mm/yyyy)	COSAC data (1)
Commissioning (part 1)	CVP1	05/03/2004	06/06/2004	**X**
Cruise 1	CR1	07/06/2004	05/09/2004	
Commissioning (part 2)	CVP2	06/09/2004	16/10/2004	**X**
Earth Swing-by 1 (including PC#0)	EAR1	17/10/2004	04/04/2005	**X**
Cruise 2 (including PC#1,2)	CR2	05/04/2005	28/07/2006	**X**
Mars Swing-by (including PC#3,4,5)	MARS	29/07/2006	28/05/2007	**X**
Cruise 3	CR3	29/05/2007	12/09/2007	
Earth Swing-by 2 (including PC#6,7)	EAR2	13/09/2007	27/01/2008	**X**
Cruise 4-1 (including PC#8)	CR4A	28/01/2008	03/08/2008	**X**
Steins Flyby	AST1	04/08/2008	05/10/2008	
Cruise 4-2 (including PC#9)	CR4B	06/10/2008	13/09/2009	**X**
Earth Swing-by 3 (including PC#10)	EAR3	14/09/2009	13/12/2009	**X**
Cruise 5 (including PC#12)	CR5	14/12/2009	06/06/2010	**X**
Lutetia Flyby	AST2	07/06/2010	10/09/2010	**X**
RV Manoeuver 1	RMV1	11/09/2010	13/07/2011	**X** (TBC)
Cruise 6	CR6	14/07/2011	22/01/2014	**X** (TBC)
RV Manoeuver 2	RVM2	23/01/2014	17/08/2014	**X** (TBC)
Comet	COM	18/08/2014	31/12/2015	**X** (TBC)

(1) The last column indicates if COSAC data are available

The data, both scientific and housekeeping, are listed in document AD 10 and AD 3.
The housekeeping data are automatically collected from CDMS when the instrument is powered, (about one packet each 4 min16s).
Remark: although the CDMS Subsystem Spec states that the HK collection interval is 2 sec, this is true only for CDMS itself. If you have a closer look at some Unit HK packets, you can clearly see that the deltaT is closer to 4:24 than to 4:16. This is based on 'insider information', it's not covered by any documentation.

The SC data are collected by COSAC into internal buffers, formatted into the science data stream structure and transferred to CDMS. The internal buffer (Mass Memory) has a size of 3M x 16 (6 Mbytes) and can be controlled to act in different modes:

- store data without transmitting them to CDMS
- buffer data during measurements, transfer packets to CDMS whenever possible (default)

In flight data products covers 3 levels :

- Raw data (CODMAC level 1) : HK and SC COSAC packets as received from DDS.
- Uncalibrated MS, GC, GC/MS Spectra (CODMAC level 2)
- Calibrated HK data (CODMAC level 3) : HK data in scientific units.
- Calibrated SC data (CODMAC level 3) : preliminary mass scales

2.3.4 Software

The software provided enables the user to read the binary packets (CODMAC level 1) stored in the PDS archive.

Housekeeping and Science Data are calibrated (to some extend) and displayed on screen, spectral data can be exported into commonly used formats.

2.3.5 Documentation

The documentation directory contains the following documents:

- COSAC Software Interface Description [AD 10]
- EAICD (this document)
- COSAC_CALIBRATION_DESC.TXT
- COSAC, the Cometary Sampling and Composition experiment on Philae
- TIMELINE_ph.TXT, timeline ASCII file for phase ph
- TIMELINE_ph_DESC.TXT, description of the timeline file for phase ph
- TIMELINE_ph_obty.PNG, timeline Image file for phase ph and observation type obty

3 Archive Format and Content

3.1 Format and Conventions

Data processing level number used in COSAC naming scheme conforms to CODMAC data level definitions:

level 1: Raw Data Telemetry data with data embedded
level 2: Edited Data Corrected for telemetry errors and split or decommutated into a data set for a given instrument. Sometimes called Experimental Data Record. Data are also tagged with time and location of acquisition. Corresponds to NASA Level 0 data.
level 3: Calibrated Data; Edited data that are still in units produced by instrument, but that have been corrected so that values are expressed in or are proportional to some physical unit such as radiance. No resampling, so edited data can be reconstructed. NASA Level 1A.

3.1.1 Deliveries and Archive Volume Format

A data set is delivered for each **simple mission phase.** Each data set contains **only one level data processing**.

The list of simple mission phases is given in AD 12.

A data set is level-stamped as below :

- Level 1 when it contains :
  - SC and HK raw data (packets) contained in .rolbin file (CODMAC level 1).

- Level 2 when it contains :
  - Uncalibrated MS, GC, GC/MS Spectra (CODMAC level 2)
  - Quick looks, chromatograms and mass spectra in PNG files (CODMAC level 2)

- Level 3 when it contains :
  - Calibrated SC and HK data (CODMAC level 3)
  - Quick looks, chromatograms and mass spectra in PNG files (CODMAC level 3)

In addition a data set contains :
- Software (see chapter 3.4.3.7)
- Documents (see chapter 3.4.3.9)

A new version of a data set is provided when :
- calibration information refining
- new data processing
- higher levels production.

3.1.2 Data Set ID Formation

The following naming formation scheme is used for the data sets :

DATA_SET_ID = <INSTRUMENT_HOST_ID>-<target id>-<INSTRUMENT_ID>-<data processing level number>-<mission phase abbreviation>-<version>

DATA_SET_NAME = <INSTRUMENT_HOST_NAME> <target name> <INSTRUMENT_ID> <data processing level number> <mission phase abbreviation> <version>

See appendix AD 12

Examples of DATA_SET_ID and DATA_SET_NAME for COSAC data obtained in-flight during CVP Block1:

DATA_SET_NAME = "ROSETTA-LANDER CAL COSAC 3 CVP V1.0"

DATA_SET_ID = "RL-CAL-COSAC-3-CVP -V1.0"

3.1.3 Data Directory Naming Convention

See § 3.4.3

3.1.4 Filenaming Convention

The following file naming scheme is used:

{**exp**}_{**source and datatype**}_{**begin of observation**}_{**length of observation**}.{**ext**}

- **exp** (3 character) = COS (fixed)
- **source and datatype** (5 characters) = DXXTL
  - D = data, **G** for Ground, **F** for Flight
  - XX = source
    - **GC** for GC measurements
    - **MS** for MS measurements
    - **GM** for combined GC & MS measurements
    - **XX** when unknown, that is in rolbin files and HK files

- T = type, **S** for Science Data, **H** for Housekeeping Data, **B** for files with both data mixed together
- L = CODMAC level : **1** for raw data, **2** for edited data, **3** for calibrated data, **P** for Plots

- **begin of observation** (12 characters) = time of measurement in UTC yymmddhhmmss:
  - yy = year
  - mm = month
  - dd = day
  - hh=hour
  - mm = minute
  - ss = second
- **length of observation** (4 characters) = duration of measurement in minutes.
  - For SC data, a file contains data from one measurement session (one spectrum for MS or GC measurements, severals spectrums for combined GC & MS measurements).
  - For calibrated HK flight data, a session is determined by a gap of 24 hours between successive data. Then, a new file is created.
- **ext** = extension of file. For COSAC possible extensions are:
  - ROL for Raw Data containing HK and SC data mixed together (CODMAC level 1)
  - LBL for label file associated to one or more data files (TAB) (in the case of "combined detached labels")
  - TAB for raw and calibrated SC data (CODMAC levels 2 and 3)
  - TAB for calibrated HK data (CODMAC level 3)
  - PNG for Plot Data in BROWSE directory (plots of TAB and CSV data)

The data files (TAB) pointed by a "combined detached label" file have the field "length of observation" replaced by the COSAC data type (see 4.3.2 for the COSAC measurements description):

- CONF for TC_ID, CSIB_CFG_ID, CSIB_PAR_ID data.
- TIME for TIME_ID data
- ADCM for ADC_MS_ID data
- ADCG for ADC_GC_ID data
- HKID for HK_ID data
- GCID for GC_ID spectrum data
- MSID for MS_ID spectrum data

Example:

COS_FMSS2_041006190521_0004.LBL
COS_FMSS2_041006190521_CONF.TAB
COS_FMSS2_041006190521_HKID.TAB
COS_FMSS2_041006190521_TIME.TAB
COS_FMSS2_041006190521_ADCM.TAB
COS_FMSS2_041006190521_MSID.TAB

Data included in these files are flight MS data recorded on 06 Oct 2004 beginning at 19:05:21 (UTC) for a duration of 4 minutes.

Example for COSAC flight software version 1.8:

COS_FMSS2_090930164707_0001.LBL
COS_FMSS2_090930164707_CONF.TAB
COS_FMSS2_090930164707_HKID.TAB
COS_FMSS2_090930164707_HBID.TAB
COS_FMSS2_090930164707_MSID.TAB

Data included in these files are flight MS data recorded on 30 September 2009 beginning at 16:47:07 (UTC) for a duration of 1 minutes.

3.2 Standards Used in Data Product Generation

3.2.1 PDS Standards

The archive structure given in this document complies with PDS standard version 3.6.

3.2.2 Time Standards

3.2.2.1 Generalities

This paragraph gives a summary of the different existing formats in the Rosetta Ground segment, from their generation by the instruments to their availability at SONC :

- The Lander CDMS requires the scientific instruments to transmit the data by bursts of 8 or 64 bytes (4 or 32 16-bit words)
- When sufficient data are received, the CDMS builds packets containing 256 bytes of instrument data. The CDMS adds 18 bytes header (unit PID, sequence count, OOBT : Orbiter OBT, data type) and a 2 bytes checksum (DECW) and creates packets with a fixed length of 276 bytes[1]. For transmission between Lander and Orbiter, a 4 bytes synchro header and a 2 bytes trailing checksum (PECW) are added, increasing the packet size to 282 bytes. The extra bytes are removed by the ESS.

  To comply with ESA requirements, the time registered in the CDMS packets is the **OOBT**. It is reconstituted from the LOBT, as shown in Figure 1:

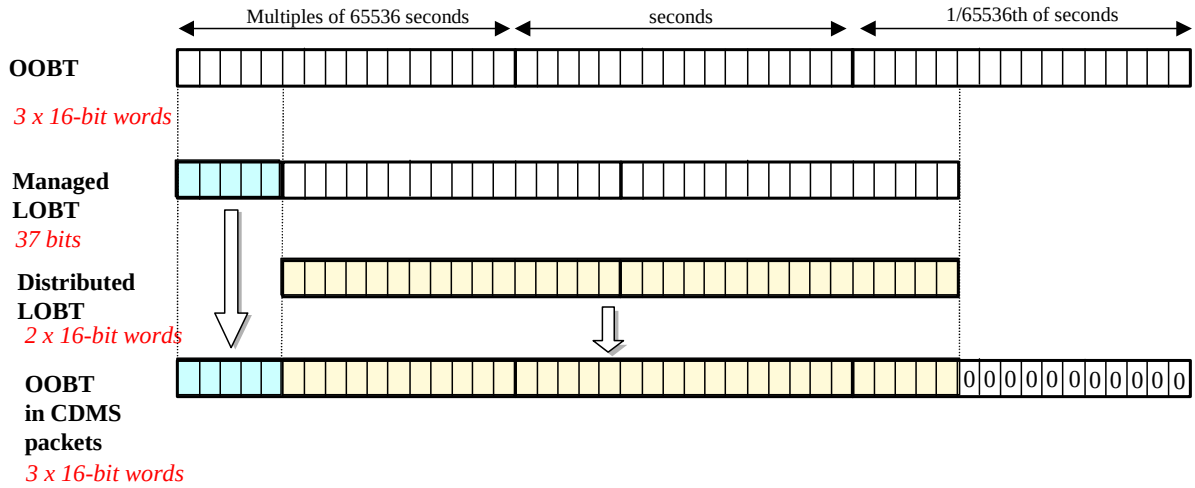

Figure 1 Reconstruction of on board time in CDMS packets

[1] The Lander CDMS header and the headers of the telemetry source packets from the Orbiter instruments are quite similar. There is a difference in the data field header. The byte containing PUS version, checksum flag and spare fields is set to zero in the CDMS header. Besides the last byte of the OOBT is set to zero in the CDMS header. The CDMS header has an additional word (2 bytes) after the data field header named "FORMAT ID". This word is mainly used for HK data and it contains the HK scanning period and the SID (structure identification).

- The ESS groups together several packets and passes them to the Orbiter OBDH, which transmits them according to the Space/Ground interface. This part is transparent for the Lander ground segment.
- The data are delivered by the Rosetta Data Distribution System (DDS) to the SONC in SFDU format. A SFDU file is basically a collection of 276-byte packets interspersed with auxiliary information records. An 18 bytes SFDU header is added to the CDMS 276-byte packets. This header contains information added at the ground station (time correlated OBT, ground station id, virtual channel id, service channel, type of data, time quality)
- SONC processes the SFDU files to retrieve the 276-byte packets. This format is available in the SONC database.

The relationship between both time (OOBT and LOBT) formats is given in AD 11.

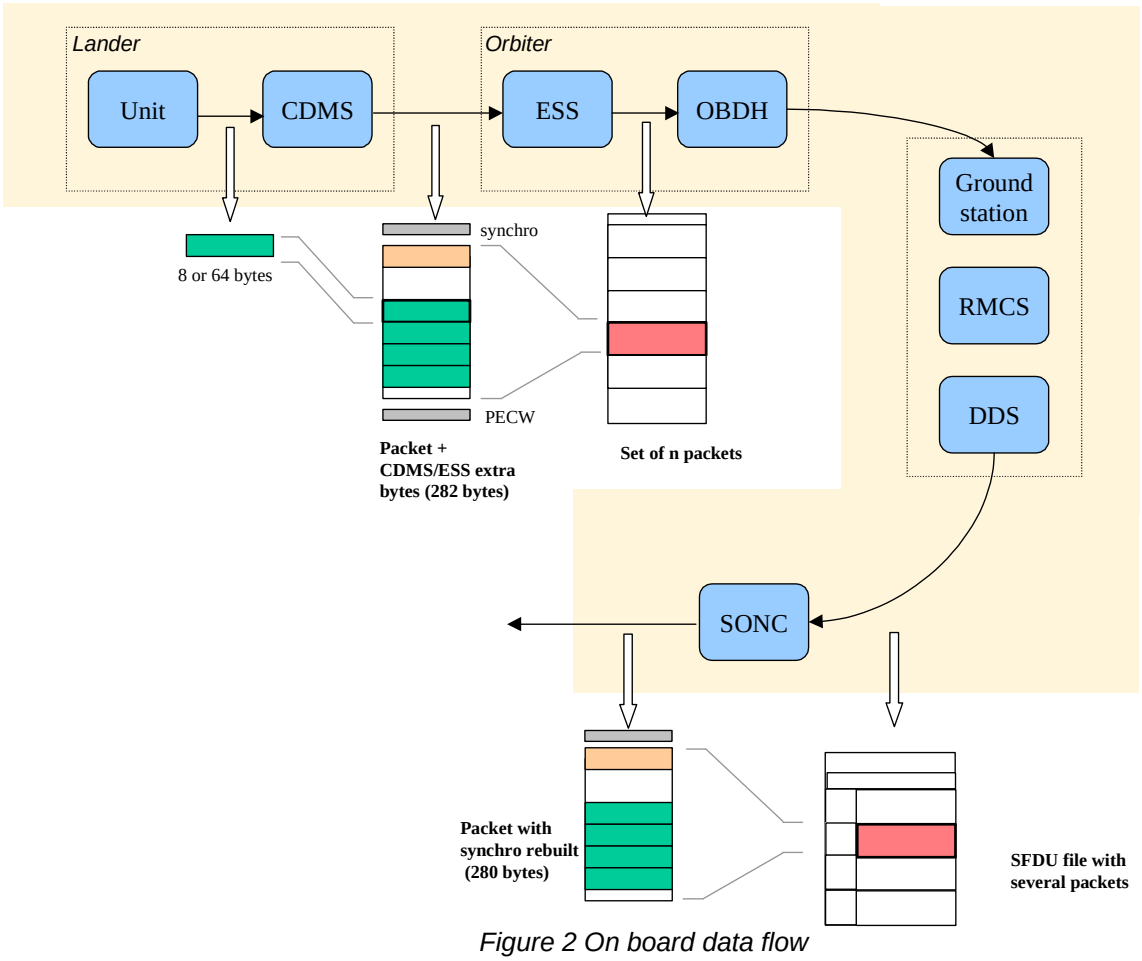

Figure 2 On board data flow

- Afterwards, SONC processes science raw packets in order to recompose the science measurement (e.g. an image, a spectrum, ...).

Figure 2 gives an overview of this data flow.

The following principles are applied :

- the packet wrapping is removed, and science frames that had to be split into several raw data packets are rebuilt. Basic error detection controls are applied, to recover from possible problems in the transmission chain.

- the Lander On-Board time (LOBT) (synchronised with OOBT) extracted from the packet, and corresponding UTC time are added.

- UTC time is calculated from the On-Board time taking into account the On-Board clock drift as following : UTC (seconds since 01/01/1970) = LOBT(seconds) * Gradient + Offset (these coefficients are extracted from TCP packets delivered by DDS).
LOBT is either the LOBTextracted from CDMS header or the Experiment internal clock when it exists (CIVA, COSAC, PTOLEMY, ROMAP, ROLIS, SESAME). In the last case, it must be taken into account that the Internal clock (32 bits) resets all 4 years, 4 months, 3 days (first reset : 03/04/2007 10 :42 :07).

UTC time-stamped Science and HK data are available in the SONC database and used to generate PDS format.

3.2.2.2 COSAC Time standards

The time standards used in the COSAC data products are :
- the COSAC on-board time,
- the Lander on-board time,
- the DDS header time correlated,
- the UTC.

3.2.2.2.1 The COSAC On-Board Time

The LOBT is the only time available to the instrument during operation. CDMS broadcasts the timing information to enabled units via the SSIF. The update interval varies according to the mode CDMS is currently operating in (either 1 or 32 sec). A copy of the current LOBT is used to time stamp COSAC HK packets to allow for synchronisation with generated SC data.

COBT
A new version (V1.8) of COSAC flight software was uploaded on 23 September 2009 at 22h00 UTC. As the timing information broadcasted by CDMS does not provide the adequate resolution to time tag science data taken with the new measurement routines (v1.8), a new time base was introduced: COBT, Cosac On-Board Time. COBT starts from '0' the moment the SW is handed over control from the debug monitor and provides a resolution of 1 ms. COBT replaces LOBT as the timing information in all science data structures. More information on COBT can be found in [AD 10].

3.2.2.2.2 The Lander On-Board Time (LOBT)

The instruments on board the spacecraft (Orbiter) generate telemetry source packets with an OOBT (orbiter on board time) time stamp in the header.
The OOBT written into the packet header specifies the time, when CDMS can complete a packet.

In terms of HK packets this is the time of the last HK word. Using the HK scanning rate, which is given in word #9 of the packet, one can calculate the OBT of every individual word in this packet. Note that this is only valid if packets with SID (word #9) 1 or 2 are generated. Packets with SID 4 and 5 are "snapshots", which means you can apply the packet OOBT for every word in this packet. SID 3 packets have to be analysed case by case.

In terms of SC packets this is the reception of the last 32 word block by CDMS, which also completes the SC packet. How often 32 word blocks are created (and sent) by the unit, and corresponding to this the delta time between each block, might be different for each unit. So, re-calculation of OOBT for SC words depends on this unit feature.

The Orbiter On-Board Time (OOBT) is a linear binary counter having a resolution of 1/65536 sec stored in 3 16-bit words.

The Lander On-Board Time (LOBT) is a linear binary counter having a resolution of 1/32 sec, kept in 37 bits. Only the 32 least significant bits are distributed to the instruments, in 2 16-bit words. The 5 most significant bits are supposed constant during most of the mission, they are available through a specific service.
The LOBT is derived from the Orbiter On-Board Time (OOBT) : the 11 least significant bits of the OOBT are discarded to obtain the LOBT, hence the reduced resolution. A re-synchronization between OOBT and LOBT is performed regularly (see AD 4).
The Lander is synchronized prior to Separation and during every RF link after landing. So, during descent and the First Science Sequence this should not be a problem, since LOBT keeps synchronized as long as the Lander is powered.

Technical details about sychronisation of Lander On-board Time can be found in § 2.3.2.6 AD 4 of "Command and Data Management System (CDMS) Subsystem Specification 29/08/2001, Issue 3, Rev. 5, **RO-LCD-SP-3101**" (AD 4).

For a description of time handling in the Rosetta project see AD 6 (Rosetta Time handling **RO-EST-TN-3165**, issue 1 rev 0, February 9, 2004).
For a description of Lander on board time handling see AD 4 (Command and Data Management System (CDMS) Subsystem Specification 29/08/2001, Issue 3, Rev. 5 **RO-LCD-SP-3101**) :
§ 2.3.2.6 Synchronisation and Adjustment of Lander On-board Time
§ 2.3.2.6.1 Absolute vs. relative time references
§ 2.3.2.6.2 On-board Time Failure Modes and Recovery Procedures
and AD 5 (Command and Data Management System (CDMS) Operation Manual 12/02/2001, Issue 1, Rev. 2 **RO-LCD-SW-3402**) : § 6. About Lander On-board Time.

3.2.2.2.3 The DDS header time correlated

The OOBT is converted to UTC (Coordinated Universal Time) by means of time correlation and included in the additional DDS packet header when the packets are distributed via the DDS server.
The **DDS header time correlated** (SCET field in the DDS header) is the UTC of the start of measurement derived from the OOBT by time correlation.

Its format is the Sun Modified Julian Time (MJT) i.e. two 32 bit integers. The first (MSB) contains the number of seconds since 00:00:00 on 1st January 1970 and the second (LSB) integer the number of micro-seconds from seconds in the first field.

Time correlation is described in AD 7 (Data Delivery Interface Document RO-ESC-IF-5003 Issue B6 23/10/2003 Appendix 18 § 18.1.2.1)

3.2.2.2.4 The UTC (Universal Time Coordinated)

The **UTC** is used as a time stamp for SC and HK COSAC data products (from level 2 to level 3).

Spectrum UTC is calculated from the internal on-board time taking into account the drift and reset clock. See [AD 6] for more details.

3.2.3 Reference Systems

Reference systems is not relevant for COSAC data experiment.

3.3 Data Validation

COSAC data products are delivered to PSA by SONC. The level 3 SC and HK data produced by SONC are validated by COSAC PI. These data are also distributed via the W3-SONC server and used by all Lander experiment teams.

3.3.1 Data Quality ID

The values of the DATA_QUALITY_ID for CODMAC level 1 (raw telemetry data) data:

-1 not assessed
0 data complete
1 <5% missing packets
2 >5%, <10% missing data
3 >10%, <20% missing data
4 >20% missing data

The values of the DATA_QUALITY_ID for CODMAC levels 2 and 3 MS data:

-1 not assessed
0 full spectrum
1 incomplete spectrum
2 empty spectrum
3 N/A
4 N/A

The values of the DATA_QUALITY_ID for CODMAC level 2 and 3 GC data:

-1 not assessed
0 full chromatogram
1 off scale (0x0000 values)
2 off scale (0x0FFF values)
3 N/A
4 N/A

3.4 Content

3.4.1 Volume Set

One volume corresponds to one data set. The possible values of VOLUME keywords can be found in [AD 12]. The volume keyword values for the Commissioning mission phase are given in the following example.

```
VOLUME_NAME                  = "COSAC RAW DATA FOR THE
                               COMMISSIONING PHASE"
VOLUME_SERIES_NAME           = "ROSETTA SCIENCE ARCHIVE"
VOLUME_SET_ID                = "DE_MPG_MPS_RLCOS_10XX"
VOLUME_SET_NAME              = "ROSETTA COSAC DATA"
VOLUME_ID                    = "RLCOS2_1013"
VOLUME_VERSION_ID            = "VERSION 1"
VOLUME_FORMAT                = "ISO-9660"
MEDIUM_TYPE                  = "ONLINE"
VOLUMES                      =  36
PUBLICATION_DATE             = 2006-11-13
DESCRIPTION                  = " This volume contains data
                                 and supporting documentation
```

```
                                    from the Rosetta Commissioning
                                    mission phase "
```

3.4.2 Data Set

The COSAC data is archived in as many Data Sets as simple mission phase and level data processing.

Name element	**Data Set ID**	**Data Set Name**
INSTRUMENT_HOST_ID / INSTRUMENT_HOST_NAME	RL (Rosetta Lander)	ROSETTA-LANDER
Target id / target name	See AD 12	in AD 12
INSTRUMENT_NAME	COSAC - COMETARY SAMPLING AND COMPOSITION EXPERIMENT	
INSTRUMENT_ID	COSAC	
Data processing level number	* Level 1 contains level 1 SC and HK. * Level 2 contains level 2 SC. * Level 3 is contains level 3 SC and level 3 HK Remark : all are delivered directly after the end of the proprietary period	
mission phase abbreviation	See AD 12	
description	N/A	N/A.
version	The first version of a data set is V1.0	

3.4.3 Directories

The COSAC archive have the following directory structure :

```
                        |-AAREADME.TXT
                        |-CATALOG-
                        |-DATA---- (contains Level 1 data files, HK and SC mixed)
|-root directory------ |
                        |-DOCUMENT-
                        |-EXTRAS-
                        |-INDEX-
                        |-VOLDESC.CAT


                        |-AAREADME.TXT
                        |-BROWSE-
                        |-CATALOG-
                        |
                        |-DATA----------- (contains  Level 2 SC data files)
|-root directory------ |
                        |-DOCUMENT-
                        |-INDEX-
                        |-LABEL-
                        |-VOLDESC.CAT


                        |-AAREADME.TXT
```

```
                          |-BROWSE-
                          |-CATALOG-
                          |
                          |-DATA----------- (contains  Level 3 HK, SC, data files)
|-root directory------ |
                          |-DOCUMENT-
                          |-INDEX-
                          |-LABEL-
                          |-VOLDESC.CAT
```

The BROWSE and LABEL directories are not present in the level 1 data set.

3.4.3.1 Root Directory

The root directory of COSAC contains the following files :

File Name	Contents
AAREADME.TXT	Volume content and format information
VOLDESC.CAT	A description of the contents of this volume in PDS format readable by both humans and computers

The name of the root directory is the data set ID.

3.4.3.2 Calibration Directory

Calibration information can be found in the file COSAC_CALIBRATION_DESC.TXT located in the DOCUMENT directory.

3.4.3.3 Catalog Directory

The catalog directory provides a top level understanding of the mission, spacecraft, instruments and data sets. The catalog directory contains the following files:

File Name	Contents
CATINFO.TXT	A description of the contents of the catalog directory
DATASET.CAT	Data set information
INST.CAT	Instrument information
INSTHOST.CAT	Instrument host (spacecraft) information
MISSION.CAT	Mission information
PERSON.CAT	PDS personnel catalog information about the instrument team responsible for generating the data products. There is one file for each instrument team providing data to this data set.
REF.CAT	Full citations for references mentioned in any and all of the catalog files, or in any associated label files
SOFTWARE.CAT	Information about the software included in the SOFTWARE directory

3.4.3.4 Index Directory

The index directory contains the indices for all data products on the data set. The following files are included in the index directory :

3.4.3.4.1 Dataset Index File

File Name	Contents
BROWSE_INDEX.LBL	PDS label for the BROWSE index file BROWSE_INDEX.TAB
BROWSE_INDEX.TAB	Index of the BROWSE directory
INDEX.LBL	PDS label for the volume index file, INDEX.TAB
INDEX.TAB	Volume index in tabular format
INDXINFO.TXT	A description of the contents of the Index Directory

3.4.3.4.2 Geometric Index File

The following Geometry index files is created, according to reference targets. They are available in a general dataset TBD

File Name	File Contents
GEO_EARTH.LBL	A PDS detached label that describes GEO_EARTH.TAB
GEO_EARTH.TAB	A table listing the geometric index parameters for reference target EARTH
GEO_MARS.LBL	A PDS detached label that describes GEO_MARS.TAB
GEO_MARS.TAB	A table listing the geometric index parameters for reference target MARS
GEO_STEINS.LBL	A PDS detached label that describes GEO_STEINS.TAB
GEO_STEINS.TAB	A table listing the geometric index parameters for reference target STEINS
GEO_LUTETIA.LBL	A PDS detached label that describes GEO_LUTETIA.TAB
GEO_LUTETIA.TAB	A table listing the geometric index parameters for reference target LUTETIA

3.4.3.5 Browse Directory and Browse Files

The Browse Directory contains plots (PNG files) that are one to one mapping of the corresponding edited and calibrated SC and HK data (TAB and CSV files) in the DATA directory.

For file naming convention see § 3.1.4.
The browse directory contains also the file BROWINFO.TXT which describes the contents of the browse directory.

3.4.3.6 Geometry Directory

TBD

3.4.3.7 Software Directory

The EGSE software is used to read raw telemetry data (CDMS rolbin files). As it does not comply with PDS strong requirements on software for long term archiving, it is instead located in the EXTRAS directory. All information regarding the usage and requirements for the software are provided in documentation located in COSAC_EGSE directory. The SOFTWARE.CAT file in the CATALOG directory includes additional information pointing to the software and outlining its basic usage and requirements.

3.4.3.8 Label Directory

The label directory contains include files referenced by data files on the data set, e.g. FMT files containing label definitions used in data label files. The following files are contained in the Label directory.

File Name	Contents
LABINFO.TXT	A description of the contents of the LABEL directory
COSAC_ADC_GC.FMT	The description of the table object for Analog GC housekeeping values; valid for flight software version previous to 1.8.
COSAC_ADC_MS.FMT	The description of the table object for Analog MS housekeeping values; valid for flight software version previous to 1.8.
COSAC_CONFIG.FMT	The description of the table object for COSAC Configuration data (tapping Station, MS and GC) and device and experiment parameters (MS and GC).
COSAC_CONFIG_FM1_8.FMT	The description of the table object for COSAC Configuration data (tapping Station, MS and GC) and device and experiment parameters (MS and GC); valid for flight software version previous to 1.8.
COSAC_FULL_HK_SC.FMT	The description of the table object for the complete set of COSAC housekeeping values; valid for flight software version previous to 1.8.
COSAC_GC_SPECTRUM_2.FMT	The description of the table object for GC science data, CODMAC level 2; valid for flight software version previous to 1.8.
COSAC_GC_SPECTRUM_2_FM1_8.FMT	The description of the table object for GC science data, CODMAC level 2 and flight software version 1.8.
COSAC_GC_SPECTRUM_3.FMT	The description of the table object for GC science data, CODMAC level 3; valid for flight software version previous to 1.8.
COSAC_GC_SPECTRUM_3_FM1_8.FMT	The description of the table object for GC science data, CODMAC level 3 and flight software version 1.8.
COSAC_HK_BURST.FMT	The description of the table object for COSAC housekeeping data valid for flight software version 1.8. This structure replaces the ADC_GC and ADC_MS structures from the previous flight software version.
COSAC_MS_SPECTRUM_2.FMT	The description of the table object for MS science data, CODMAC level 2; valid for flight software version previous to 1.8.
COSAC_MS_SPECTRUM_2_FM1_8.FMT	The description of the table object for MS science data, CODMAC level 2 and flight software version 1.8.
COSAC_MS_SPECTRUM_3.FMT	The description of the table object for MS science data, CODMAC level 3; valid for flight software version previous to 1.8.
COSAC_MS_SPECTRUM_3_FM1_8.FMT	The description of the table object for MS science data, CODMAC level 3 and flight software version 1.8.

COSAC_TIME_ID.FMT	The description of the table object for timing information valid for flight software version previous to 1.8.

3.4.3.9 Document Directory

This directory contains documentation to help the user to understand and use the archive data. The following files are contained in the document directory:

File Name	Contents
DOCINFO.TXT	A description of the contents of this directory
RO-LCO-IF-340001.PDF	COSAC Software Interface Description
RO-LCO-IF-340001.LBL	PDS label for file RO-LCO-IF-340001.PDF
EAICD_COSAC.PDF	This document
EAICD_COSAC.LBL	PDS label for file EAICD_COSAC.PDF
COSAC.LBL	PDS label for file COSAC.PDF
COSAC.PDF	Description of the COSAC experiment
COSAC_CALIBRATION_DESC.LBL	PDS label for file COSAC_CALIBRATION_DESC.TXT
COSAC_CALIBRATION_DESC.TXT	Calibration information for COSAC calibrated data
TIMELINE_*ph*.TXT	Timeline Ascii file with the PDS label attached for phase *ph*
TIMELINE_*ph*_DESC.TXT	Description of the timeline file for phase *ph*
TIMELINE_*ph_obty*.PNG	Timeline Image file for phase *ph* and observation type *obty*
TIMELINE_*ph_obty*.LBL	PDS label for image TIMELINE_*ph_obty*.PNG

3.4.3.10 Extras Directory

The Extras directory contains EGSE software to read and visualize raw telemetry data (CDMS rolbin files, CODMAC level 1). The contents of the EXTRAS directory are shown below :

```
|-EXTRAS----------|-COSAC_EGSE---|-EGSE.EXE
                  |
                  |-EXTRINFO.TXT
```

The EGSE Directory contains the following files :

File Name	Contents
EGSE.EXE	EGSE software (PC, MS Windows executable) for extracting data from the raw data product files (rolbin), calibration and visualisation.
EGSE.LBL	PDS label for file EGSE.EXE
EXTRTINFO.TXT	A description of the contents of the Extras Directory

3.4.3.11 Data Directory

The structure and naming scheme of the data directory is described in chapter 3.1.3.

4 Detailed Interface Specifications

4.1 Structure and Organization Overview

The data files are archived in a data set on the basis of the mission phase relative to the production of the data.
Each .ROL (rolbin) file containing the raw data (telemetry packets, CODMAC level 1) is placed in the DATA directory of the corresponding dataset (with level 1 data files, HK and SC mixed).
Each .TAB file containing uncalibrated SC data (CODMAC level 2) is archived in the DATA directory of the corresponding dataset (with level 2 SC data files).
Each .TAB file containing calibrated SC data (CODMAC level 3) and each .CSV file containing calibrated HK (CODMAC level 3) data is archived in the DATA directory of the corresponding datasets (with level 3 HK data files and level 3 SC data files).
The file names follows the rules explained in this document (§3.1.4).

4.2 Data Sets, Definition and Content

The following table gives the definition of the name and id of the foreseen data sets :

Data Set ID	**Data Set Name**
RL-CAL-COSAC-1-CVP-V1.0	ROSETTA-LANDER CAL COSAC 1 CVP V1.0
RL-CAL-COSAC-1-CR2-V1.0	ROSETTA-LANDER CAL COSAC 1 CR2 V1.0
RL-CAL-COSAC-1-CR4A-V1.0	ROSETTA-LANDER CAL COSAC 1 CR4A V1.0
RL-CAL-COSAC-1-CR5-V1.0	ROSETTA-LANDER CAL COSAC 1 CR5 V1.0
RL-E-COSAC-1-EAR1-V1.0	ROSETTA-LANDER EARTH COSAC 1 EAR1 V1.0
RL-E-COSAC-1-EAR2-V1.0	ROSETTA-LANDER EARTH COSAC 1 EAR2 V1.0
RL-E-COSAC-1-EAR3-V1.0	ROSETTA-LANDER EARTH COSAC 1 EAR3 V1.0
RL-M-COSAC-1-MARS-V1.0	ROSETTA-LANDER MARS COSAC 1 MARS V1.0
RL-A-COSAC-1-AST2-V1.0	ROSETTA-LANDER LUTETIA COSAC 1 AST2 V1.0
RL-CAL-COSAC-1-RVM1-V1.0	ROSETTA-LANDER CAL COSAC 1 RVM1 V1.0
RL-CAL-COSAC-1-RVM2-V1.0	ROSETTA-LANDER CAL COSAC 1 RVM2 V1.0
RL-C-COSAC-1-COM-V1.0	ROSETTA-LANDER 67P COSAC 1 COM V1.0
RL-CAL-COSAC-2-CVP-V1.0	ROSETTA-LANDER CAL COSAC 2 CVP V1.0
RL-CAL-COSAC-2-CR2-V1.0	ROSETTA-LANDER CAL COSAC 2 CR2 V1.0
RL-CAL-COSAC-2-CR4A-V1.0	ROSETTA-LANDER CAL COSAC 2 CR4A V1.0
RL-CAL-COSAC-2-CR5-V1.0	ROSETTA-LANDER CAL COSAC 2 CR5 V1.0
RL-E-COSAC-2-EAR1-V1.0	ROSETTA-LANDER EARTH COSAC 2 EAR1 V1.0
RL-E-COSAC-2-EAR2-V1.0	ROSETTA-LANDER EARTH COSAC 2 EAR2 V1.0
RL-E-COSAC-2-EAR3-V1.0	ROSETTA-LANDER EARTH COSAC 2 EAR3 V1.0
RL-M-COSAC-2-MARS-V1.0	ROSETTA-LANDER MARS COSAC 2 MARS V1.0
RL-A-COSAC-2-AST2-V1.0	ROSETTA-LANDER LUTETIA COSAC 2 AST2 V1.0
RL-CAL-COSAC-2-RVM1-V1.0	ROSETTA-LANDER CAL COSAC 2 RVM1 V1.0
RL-CAL-COSAC-2-RVM2-V1.0	ROSETTA-LANDER CAL COSAC 2 RVM2 V1.0
RL-C-COSAC-2-COM-V1.0	ROSETTA-LANDER 67P COSAC 2 COM V1.0
RL-CAL-COSAC-3-CVP-V1.0	ROSETTA-LANDER CAL COSAC 3 CVP V1.0
RL-CAL-COSAC-3-CR2-V1.0	ROSETTA-LANDER CAL COSAC 3 CR2 V1.0

RL-CAL-COSAC-3-CR4A-V1.0	ROSETTA-LANDER CAL COSAC 3 CR4A V1.0
RL-CAL-COSAC-3-CR5-V1.0	ROSETTA-LANDER CAL COSAC 3 CR5 V1.0
RL-E-COSAC-3-EAR1-V1.0	ROSETTA-LANDER EARTH COSAC 3 EAR1 V1.0
RL-E-COSAC-3-EAR2-V1.0	ROSETTA-LANDER EARTH COSAC 3 EAR2 V1.0
RL-E-COSAC-3-EAR3-V1.0	ROSETTA-LANDER EARTH COSAC 3 EAR3 V1.0
RL-M-COSAC-3-MARS-V1.0	ROSETTA-LANDER MARS COSAC 3 MARS V1.0
RL-A-COSAC-3-AST2-V1.0	ROSETTA-LANDER LUTETIA COSAC 3 AST2 V1.0
RL-CAL-COSAC-3-RVM1-V1.0	ROSETTA-LANDER CAL COSAC 3 RVM1 V1.0
RL-CAL-COSAC-3-RVM2-V1.0	ROSETTA-LANDER CAL COSAC 3 RVM2 V1.0
RL-C-COSAC-3-COM-V1.0	ROSETTA-LANDER 67P COSAC 3 COM V1.0

4.3 Data Product Design

All COSAC data products have PDS detached labels.

4.3.1 Data Product Raw COSAC data (Level 1)

Level 1 contains mixed raw housekeeping and science data packets delivered by the Rosetta Lander with detached PDS labels.

4.3.1.1 File Characteristics Data Elements

The raw files (level 1) are described by PDS minimal detached labels. The file characteristic data elements are RECORD_TYPE, PRODUCT_TYPE and FILE_NAME. The PRODUCT_TYPE is UDR. The RECORD_TYPE for raw data is UNDEFINED, i.e. the structure of records is not described in the PDS labels since these data are intended to be processed with the EGSE software available in the EXTRAS directory. The file contains telemetry packets which are described in [AD 10].

4.3.1.2 Instrument and Detector Descriptive Data Elements

```
INSTRUMENT_HOST_NAME    = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID      = RL
INSTRUMENT_ID           = COSAC
INSTRUMENT_NAME         = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE         = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID      = "N/A"
INSTRUMENT_MODE_DESC    = "N/A"
```

4.3.2 Data Product Design of Science Data (Level 2 and 3)

Each COSAC science PDS file contains data from one measurement cycle. There are 3 types of measurements, GC (gas chromatograph), MS (mass spectrum) and combined GC/MS. A measurement cycle always starts with TC_ID tag. The TC_ID tag contains a copy of the complete "start action" TC and indicates the type of measurement and the number of cycles. The structures of COSAC measurements differ according to flight software version. Details can be found in [AD 10] for flight software version 1.8 (uploaded on 23 September 2009 at 22h00 UTC) and in [AD 9] for previous flight software version.

The science data products have different structures according to COSAC flight software version.
The following structures are valid for flight software previous to version 1.8 (the "+" indicates that the item can appear several times in the measurement):

GC measurements:

- TC /* TC that started the measurement */
- CSIB_CFG /* device configuration */
- CSIB_PAR /* measurement parameters */

- Housekeeping	/* complete HK set */
+ ADC_GC(1), ..., ADC_GC(n)	/* ADC HK readout */
+ GC data * n	/* GC spectrogram: time series, depends on number of cycles performed */

MS measurements:

- TC	/* TC that started the measurement */
- CSIB_CFG	/* device configuration */
- CSIB_PAR	/* measurement parameters */
- Housekeeping	/* complete HK set */
+ TIME	/* LOBT, time when measurement was started */
+ ADC_MS(1), ..., ADC_MS(n)	/* ADC HK readout */
+ MS data * n	/* Mass spectrum: time series, depends on number of cycles performed */

Combined GC/MS measurements:

- TC	/* TC that started the measurement */
- CSIB_CFG	/* device configuration */
- CSIB_PAR	/* measurement parameters */
- Housekeeping	/* complete HK set */
- ADC_GC	/* ADC GC HK readout */
+ TIME	/* LOBT, time when measurement was started */
+ ADC_MS(1), ..., ADC_MS(m)	
+ MS data(1), ..., MS data(n)	/* set of MS spectra: time series */
+ GC data	/* GC spectrogram: time series */

There are 9 possible structures for COSAC mesurements, 3 for MS, 2 for GC and 4 for GC/MS.

MS :

[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_MS_ID]? ([TIME_ID][ADC_MS_ID]*[MS_ID]?) {n}

Hk Sweeping = false for MS in CSIB_CFG
[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID] ([TIME_ID][MS_ID]?){n}

Accumulate = true for MS in CSIB_CFG
[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_MS_ID]? ([TIME_ID][ADC_MS_ID]*){n}[MS_ID]

GC :

[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_GC_ID]* ([ADC_GC_ID]*[GC_ID]?){n}

Hk Sweeping = false for GC in CSIB_CFG
[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID] ([GC_ID]?) {n}

GCMS :

[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_GC_ID]*[ADC_MS_ID]?
([ADC_GC_ID][TIME_ID][ADC_MS_ID]*[MS_ID]) {k} [GC_ID]

Hk Sweeping = False for MS and False for GC in CSIB_CFG
[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID] ([ADC_GC_ID][TIME_ID][MS_ID]) {k} [GC_ID]

Hk Sweeping = True for MS and False for GC CSIB_CFG

[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_MS_ID]
([ADC_GC_ID][TIME_ID][ADC_MS_ID]*[MS_ID]) {k} [GC_ID]

Hk Sweeping = False for MS and True for GC in CSIB_CFG
[TC_ID][CSIB_CFG_ID][CSIB_PAR_ID][HK_ID][ADC_GC_ID]* ([ADC_GC_ID][TIME_ID][MS_ID]) {k}
[GC_ID]

where
* : the asterisk indicates that the previous tag must be present 0, 1, or several times
? : the question mark indicates that the previous tag must be present at most 1 time
{n} : number of measurement cycles (from [TC_ID] tag)
{k} : for GC/MS measurement only, represents the number of MS spectra in the measurement.

Each measurement cycle is described by a "combined detached label" (.LBL) containing pointers to corresponding data files (.TAB). The CONFIG table (*_CONF.TAB) contains data from TC_ID, CSIB_CFG_ID and CSIB_PAR_ID tags.

Examples:

GC measurement:

COS_FGCS2_070925010423_0000.LBL
- COS_FGCS2_070925010423_CONF.TAB
- COS_FGCS2_070925010423_HKID.TAB
- COS_FGCS2_070925010423_ADGC.TAB
- COS_FGCS2_070925010423_GCID.TAB

MS measurement:

COS_FMSS2_041006190521_0000.LBL
- COS_FMSS2_041006190521_CONF.TAB
- COS_FMSS2_041006190521_HKID.TAB
- COS_FMSS2_041006190521_TIME.TAB
- COS_FMSS2_041006190521_ADCM.TAB
- COS_FMSS2_041006190521_MSID.TAB

Combined GC/MS measurement:

COS_FGMS2_041006193328_0004.LBL
- COS_FGMS2_041006193328_CONF.TAB
- COS_FGMS2_041006193328_HKID.TAB
- COS_FGMS2_041006193328_ADGC.TAB
- COS_FGMS2_041006193328_TIME.TAB
- COS_FGMS2_041006193328_MSID.TAB
- COS_FGMS2_041006193328_ADCM.TAB
- COS_FGMS2_041006193328_GCID.TAB

The level 3 PDS labels are similar to level 2 labels.

With flight software version 1.8 new tags were introduced and consequently new structures were added for the data products. The new tags are the following:

- SD_VERSION_ID; science data stream version ID (i.e. flight software version)

- TIMEREF_ID; used to synchronize LOBT and COBT. COBT is the Cosac On-Board Time with a resolution of 1ms (see §3.2.2.2.1).
- HKBURST_ID; this structure replaces the deprecated 'ADC_MS and 'ADC_GC' structures.

At the same time the following tags were removed:
- ADC_MS_ID and ADC_GC_ID (replaced by HKBURST_ID)
- TIME_ID (the timing information is stored inside 'GC' or 'MS' tags)

Examples of new data products including the new tags (in blue) :

GC measurement:

COS_FGCS2_070925010423_0000.LBL
COS_FGCS2_070925010423_CONF.TAB (SD_VERSION_ID, TIMEREF_ID,TC_ID, CSIB_CFG_ID, CSIB_PAR_ID)
COS_FGCS2_070925010423_HKID.TAB
COS_FGCS2_070925010423_HB.TAB (HKBURST_ID)
COS_FGCS2_070925010423_GCID.TAB

MS measurement:

COS_FMSS2_041006190521_0000.LBL
COS_FMSS2_041006190521_CONF.TAB (SD_VERSION_ID, TIMEREF_ID, TC_ID, CSIB_CFG_ID, CSIB_PAR_ID)
COS_FMSS2_041006190521_HKID.TAB
COS_FMSS2_041006190521_HB.TAB (HKBURST_ID)
COS_FMSS2_041006190521_MSID.TAB

Combined GC/MS measurement:

COS_FGMS2_041006193328_0004.LBL
COS_FGMS2_041006193328_CONF.TAB (SD_VERSION_ID, TIMEREF_ID, TC_ID, CSIB_CFG_ID, CSIB_PAR_ID)
COS_FGMS2_041006193328_HKID.TAB
COS_FGMS2_041006193328_HB.TAB (HKBURST_ID)
COS_FGMS2_041006193328_MSID.TAB
COS_FGMS2_041006193328_GCID.TAB

4.3.2.1 File Characteristics Data Elements

The PDS file characteristic data elements for COSAC science data (level 2 and 3) are:

```
RECORD_TYPE    =  FIXED_LENGTH
FILE_RECORDS
PROCESSING_LEVEL_ID
```

4.3.2.2 Data Object Pointers Identification Data Elements

The COSAC SC data are organized as ASCII tables. The data object pointers (^TABLE) reference TAB files.

4.3.2.3 Data Object Definition

Each label (LBL) contains several tables. The number of tables is variable and depends on the type of measurement, of the number of spectra and of the flight software version. Nevertheless there are several tags that are common to all COSAC measurements: CONFIG, FULL_HK_ID and TIME_ID (except for GC measurement which do not have TIME_ID tag, the time being inside the GC spectrum). For flight software

version 1.8 we can add HKBURST_ID and remove the TIME_ID. We first define the TABLE object corresponding to the common tags and following in separate chapters the specific object to GC, MS and GC/MS measurements.

4.3.2.3.1 The description of the CONFIG table.

The CONFIG table contains data from TC_ID, CSIB_CFG_ID and CSIB_PAR_ID tags for flight software version previous to 1.8 and from SD_VERSION_ID, TIMEREF_ID,TC_ID, CSIB_CFG_ID, CSIB_PAR_ID tags for version 1.8.

Flight software version previous to 1.8

```
  OBJECT                    = COSAC_CONFIG_TABLE
      NAME                  = CONFIG
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  =
      ^STRUCTURE            = "COSAC_CONFIG.FMT"
      COLUMNS               = 82
      ROW_BYTES             =
  END_OBJECT                = COSAC_CONFIG_TABLE
```

Flight software version 1.8

```
  OBJECT                    = COSAC_CONFIG_TABLE
      NAME                  = CONFIG
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  =
      ^STRUCTURE            = "COSAC_CONFIG_FM1_8.FMT"
      COLUMNS               = 84
      ROW_BYTES             =
  END_OBJECT                = COSAC_CONFIG_TABLE
```

The structure of the TABLE object is described in the file COSAC_CONFIG.FMT as follows:

```
/*          Contents of format file  "COSAC_CONFIG.FMT"          */
/* TC */

 OBJECT                 = COLUMN
   NAME                 = "TC_DATA"
   DATA_TYPE            = CHARACTER
   START_BYTE           = 2
   BYTES                = 39
   DESCRIPTION          = "TC data words in hexadecimal format"
 END_OBJECT             = COLUMN

/* CSIB_CFG */
/*    Configuration data for tapping Station, MS and GC                */

/*   ------  Configuration data for Tapping Station  (30 words) ------   */

 OBJECT       = COLUMN
  NAME        = "TPST_DIR_CONTRL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 44
  BYTES       = 8
  UNIT        = "N/A"
  DESCRIPTION = "TPST: Direct controlling,
                 Possible values :
                    disabled
                    enabled"
 END_OBJECT   = COLUMN
```

```
OBJECT        = COLUMN
 NAME         = "TPST_POS_INFO"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 55
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format)  TPST: Position information
                 0x0000 = LUT , 0xffff = Value"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_POS_ID"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 62
 BYTES        = 20
 UNIT         = "N/A"
 DESCRIPTION  = " TPST: Position ID
                  Possible values :
                     Open
                     Contacts closed
                     Main Terminal closed
                     Side Terminal closed
                     Upper position
                     Lower position"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_POS_VALUE"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 85
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) TPST: Position value,
                                            potentiometer value"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_DIRECTION"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 92
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) TPST: Direction
                  CS1.D7 = 0000
                  CS1.D7 = ffff"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_TIME_TO_DRIVE"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 99
 BYTES        = 4
 UNIT         = SECOND
 DESCRIPTION  = "(Hexadecimal Format) TPST: Time to drive (sec)"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_START_CAL"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 106
```

```
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) TPST: Start calibration
                  Possible values :
                    False
                    True"
 END_OBJECT   = COLUMN


/*   -------------  Configuration data for MS (30 words) ---------------  */

 OBJECT       = COLUMN
  NAME        = "MS_HK_SWEEPING"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 114
  BYTES       = 3
  UNIT        = "N/A"
  DESCRIPTION = "MS: HK sweeping
                  Possible values :
                     yes
                     no"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_ACCUMULATE"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 120
  BYTES       = 3
  UNIT        = "N/A"
  DESCRIPTION = "MS: Accumulate parameter ; possible values :
                      yes
                      no"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_CATHODE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 125
  BYTES       = 1
  UNIT        = "N/A"
  DESCRIPTION = "MS: Cathode number to be selected"
  FORMAT      = I1
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_EMI_CURRENT"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 128
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Emission current"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_DET_VOLT"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 135
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Detector voltage"
 END_OBJECT   = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "MS_RESOL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 142
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = " MS: Resolution possible values :
                      low
                      high "
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_FREQUENCY"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 148
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = I8
  DESCRIPTION = "MS: Frequency"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_RUN CAL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 158
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "MS: Run calibration
                 Possible values :
                    False
                    True"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_SNIFFING_MODE"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 166
  BYTES       = 8
  UNIT        = "N/A"
  DESCRIPTION = "MS: Sniffing mode
                 Possible values :
                    disabled
                    enabled"
 END_OBJECT   = COLUMN


/*   -------------  Configuration data for GC (30 words) -------------   */


 OBJECT       = COLUMN
  NAME        = "GC_HK_SWEEPING"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 177
  BYTES       = 3
  UNIT        = "N/A"
  DESCRIPTION = "GC: HK sweeping
                  Possible values :
                    yes
                    no"
 END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "GC_CONTINUE_FLAG"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 183
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "GC: continue flag ; Possible values :
                   False
                   True"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_DUR_MEASURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 190
 BYTES       = 2
 UNIT        = "N/A"
 FORMAT      = I2
 DESCRIPTION = "GC: Duration of measurement
                This is an index pointing into a look-up table
                holding the following values:
                   1  : 1,12 min
                   2  : 2,23 min
                   4  : 4,47 min
                   8  : 8,95 min
                   16 : 17,89 min

                Note that any combination of the above values is possible!
                   01010 : 8,95 + 2,23 min
                   10101 : 17,89 + 4,47 + 1,12 min"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "GC_HELIUM_TANK"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 194
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "GC: Helium tank selected
                Possible values :
                   Tank 1
                   Tank 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_DUR_INJEC"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 202
 BYTES       = 8
 UNIT        = MILLISECOND
 FORMAT      = I8
 DESCRIPTION = "GC: Duration of injection (msec)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_SAMPLE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 212
 BYTES       = 15
```

```
 UNIT        = "N/A"
 DESCRIPTION = "GC: Sample
                Possible values :
                   Calibration gas
                   Oven
                   Tenax"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_1"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 229
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 1
                   Column #1  0x000i (0 <= i <= 7)
                   Column #2  0x00i0 (0 <= i <= 7)
                   Column #3  0x0i00 (0 <= i <= 7)
                   Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_2"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 231
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 2
                    Column #1  0x000i (0 <= i <= 7)
                    Column #2  0x00i0 (0 <= i <= 7)
                    Column #3  0x0i00 (0 <= i <= 7)
                    Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_3"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 233
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 3
                   Column #1  0x000i (0 <= i <= 7)
                   Column #2  0x00i0 (0 <= i <= 7)
                   Column #3  0x0i00 (0 <= i <= 7)
                   Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_4"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 235
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 4
                    Column #1  0x000i (0 <= i <= 7)
                    Column #2  0x00i0 (0 <= i <= 7)
                    Column #3  0x0i00 (0 <= i <= 7)
                    Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
```

```
  NAME         = "GC_COL_HEAD_PRESS"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 238
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) GC: Column head pressure
                  0x0000 <= x <= 0x00ff"
 END_OBJECT    = COLUMN


/* CSIB_PAR */
/*       Device parameters and experiment parameters for MS and GC          */

/*   ---------------     Device parameters   (27 words)   ---------------  */

 OBJECT        = COLUMN
  NAME         = "TPST_POS_OPEN"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 244
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Open"
 END_OBJECT    = COLUMN


 OBJECT        = COLUMN
  NAME         = "TPST_POS_CONT_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 253
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Contacts Closed"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_POS_MAIN_TERM_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 262
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Main Terminal Closed"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_POS_SIDE_TERM_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 271
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Side Terminal Closed"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_POS_UPPER"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 280
  BYTES        = 8
```

```
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "TPST: Position Upper"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POS_LOWER"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 289
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "TPST: Position Lower"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_BACKUP_RAM"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 299
 BYTES       = 3
 UNIT        = "N/A"
 DESCRIPTION = "TPST: Use of Backup Ram ; possible values :
                      yes
                      no"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_IGN_SD2 STAT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 305
 BYTES       = 3
 UNIT        = "N/A"
 DESCRIPTION = "TPST: Ignore SD2 Status  ; possible values :
                      yes
                      no"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_TIMEOUT_VALUE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 310
 BYTES       = 8
 UNIT        = "MILLISECOND"
 FORMAT      = I8
 DESCRIPTION = "TPST: Timeout Value"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_CREATE_REPORT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 320
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  TPST: Create Report"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_0"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 327
 BYTES       = 4
```

```
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_1"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 334
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_2"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 341
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_3"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 348
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[3]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_4"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 355
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[4]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_5"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 362
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[5]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_6"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 369
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[6]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_7"
 DATA_TYPE   = CHARACTER
```

```
 START_BYTE  = 376
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[7]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_0"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 383
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_1"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 390
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_2"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 397
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_3"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 404
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[3]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_4"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 411
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[4]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_5"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 418
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[5]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
```

```
  NAME         = "HEATING_TIME_6"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 425
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format)  Heating Time[6]"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "HEATING_TIME_7"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 432
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format)  Heating Time[7]"
 END_OBJECT    = COLUMN


/*   ---------------  Experiment parameters MS    (18 words) -----------  */

 OBJECT        = COLUMN
  NAME         = "MS_DURATION"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 439
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) MS: Duration
                  Basically, it's a timing information, but it varies
                  according to the programmed frequency:
                      Bit        1 kHz         4 kHz
                       3          67,1 s       16,8 s
                       2          33,5 s        8,4 s
                       1          16,8 s        4,19 s
                       0          8,4 s         2,1 s
                  Please note: any combination is possible:
                   0x7 at 1kHz = 33,5 + 16,8 + 8,4 s
                   0x7 at 4kHz = 8,4 + 4,19 + 2,1 s"

 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_USE_AUTO_CAL_VAL"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 446
  BYTES        = 5
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) MS: Use auto calibration values
                    possible values :
                         True
                         False"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_PRESSURE_CAL_GAS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 453
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "(Hexadecimal Format) MS: Pressure calibration gas"
 END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "MS_MODE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 463
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: Mode  ; possible values :
                       Single
                       Multi"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_GAS_FLOW_DELAY"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 472
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: Gas Flow Delay"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_0]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 479
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_1]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 486
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_2]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 493
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_3]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 500
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[3]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_0]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 507
```

```
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[0]
                Counter with 31,25 ms/cnt "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_1]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 514
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[1]
                Counter with 31,25 ms/cnt "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_2]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 521
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[2]
                Counter with 31,25 ms/cnt "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_3]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 528
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[3]
                Counter with 31,25 ms/cnt "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_4]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 535
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[4]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_5]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 542
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: T[5]
                Counter with 31,25 ms/cnt "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_T_6]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 549
 BYTES       = 4
 UNIT        = "N/A"
```

```
  DESCRIPTION = "(Hexadecimal Format) MS: T[6]
                   Counter with 31,25 ms/cnt "
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_DET_START_DEL"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 556
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Detector Start Delay
                   This is an integer with the following  bit allocation:
                       Bit          Sampling time delay in microseconds
                        3             256
                        2             128
                        1             64
                        0             32 "
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_WORDS_SC_DATA"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 563
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Words to copy from Science Data"
 END_OBJECT    = COLUMN


/* ---------------     Experiment parameters GC (10 words) -------------  */


 OBJECT        = COLUMN
  NAME         = "GC_TEMP_COL_0"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 569
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION = "GC: Temperature Column 0"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "GC_TEMP_COL_1"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 578
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION = "GC: Temperature Column 1"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "GC_TEMP_COL_2"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 587
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION = "GC: Temperature Column 2"
 END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_3"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 596
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 3"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_4"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 605
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_5"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 614
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 5"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_6"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 623
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "Temperature Column 6"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_7"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 632
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 7"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_WORDS_SC_DATA"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 641
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Words to copy from Science Data"
END_OBJECT   = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "GC_TIME_TENAX"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 650
  BYTES       = 8
  UNIT        = SECOND
  FORMAT      = I8
  DESCRIPTION = "GC: Time to heat Tenax (sec)"
 END_OBJECT   = COLUMN
```

The structure of the TABLE object is described in the file COSAC_CONFIG_FM1_8.FMT as follows:

```
/*          Contents of format file  "COSAC_CONFIG_FM1_8.FMT"          */


 OBJECT                 = COLUMN
   NAME                 = "SD_VERSION_ID"
   DATA_TYPE            = CHARACTER
   START_BYTE           = 2
   BYTES                = 4
   DESCRIPTION          = "Science data stream version ID,
                           in hexadecimal format.
                           Forversion V1.8 the value is 0x0180"
 END_OBJECT             = COLUMN



 OBJECT                 = COLUMN
   NAME                 = "TIMEREF_ID"
   DATA_TYPE            = CHARACTER
   START_BYTE           = 9
   BYTES                = 19
   DESCRIPTION          = "Used to synchronize LOBT and COBT.
                           The first 8 characters represent the LOBT
                           in hexadecimal (4 bytes) and the last 8
                           characters represent the COBT (4 bytes).
                           COBT is the Cosac On-Board Time with a
                           resolution of 1ms."
 END_OBJECT             = COLUMN

/* TC */

 OBJECT                 = COLUMN
   NAME                 = "TC_DATA"
   DATA_TYPE            = CHARACTER
   START_BYTE           = 31
   BYTES                = 39
   DESCRIPTION          = "TC data words in hexadecimal format"
 END_OBJECT             = COLUMN

/* CSIB_CFG */
/*    Configuration data for tapping Station, MS and GC                  */

/*   ------  Configuration data for Tapping Station  (30 words) ------   */

 OBJECT       = COLUMN
  NAME        = "TPST_DIR_CONTRL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 73
  BYTES       = 8
```

```
 UNIT        = "N/A"
 DESCRIPTION = "TPST: Direct controlling,
                Possible values :
                   disabled
                   enabled"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POS_INFO"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 84
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  TPST: Position information
                0x0000 = LUT , 0xffff = Value"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POS_ID"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 91
 BYTES       = 20
 UNIT        = "N/A"
 DESCRIPTION = " TPST: Position ID
                 Possible values :
                    Open
                    Contacts closed
                    Main Terminal closed
                    Side Terminal closed
                    Upper position
                    Lower position"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POS_VALUE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 114
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) TPST: Position value,
                                           potentiometer value"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_DIRECTION"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 121
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) TPST: Direction
                 CS1.D7 = 0000
                 CS1.D7 = ffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_TIME_TO_DRIVE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 128
 BYTES       = 4
 UNIT        = SECOND
 DESCRIPTION = "(Hexadecimal Format) TPST: Time to drive (sec)"
```

```
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_START_CAL"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 135
  BYTES        = 5
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) TPST: Start calibration
                  Possible values :
                    False
                    True"
 END_OBJECT    = COLUMN


/*   -------------  Configuration data for MS (30 words) ---------------  */

 OBJECT        = COLUMN
  NAME         = "MS_HK_SWEEPING"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 143
  BYTES        = 3
  UNIT         = "N/A"
  DESCRIPTION  = "MS: HK sweeping
                  Possible values :
                     yes
                     no"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_ACCUMULATE"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 149
  BYTES        = 3
  UNIT         = "N/A"
  DESCRIPTION  = "MS: Accumulate parameter ; possible values :
                      yes
                      no"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_CATHODE"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 154
  BYTES        = 1
  UNIT         = "N/A"
  DESCRIPTION  = "MS: Cathode number to be selected"
  FORMAT       = I1
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_EMI_CURRENT"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 157
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) MS: Emission current"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_DET_VOLT"
```

```
  DATA_TYPE    = CHARACTER
  START_BYTE   = 164
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) MS: Detector voltage"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_RESOL"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 171
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = " MS: Resolution possible values :
                       low
                       high "
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_FREQUENCY"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 177
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "MS: Frequency"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_RUN CAL"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 187
  BYTES        = 5
  UNIT         = "N/A"
  DESCRIPTION  = "MS: Run calibration
                  Possible values :
                     False
                     True"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "MS_SNIFFING_MODE"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 195
  BYTES        = 8
  UNIT         = "N/A"
  DESCRIPTION  = "MS: Sniffing mode
                  Possible values :
                     disabled
                     enabled"
 END_OBJECT    = COLUMN


/*   -------------  Configuration data for GC (30 words) -------------   */


 OBJECT        = COLUMN
  NAME         = "GC_HK_SWEEPING"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 206
  BYTES        = 3
```

```
 UNIT        = "N/A"
 DESCRIPTION = "GC: HK sweeping
                 Possible values :
                   yes
                   no"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CONTINUE_FLAG"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 212
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "GC: continue flag ; Possible values :
                   False
                   True"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_DUR_MEASURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 219
 BYTES       = 2
 UNIT        = "N/A"
 FORMAT      = I2
 DESCRIPTION = "GC: Duration of measurement
                This is an index pointing into a look-up table
                holding the following values:
                   1  : 1,12 min
                   2  : 2,23 min
                   4  : 4,47 min
                   8  : 8,95 min
                   16 : 17,89 min

                Note that any combination of the above values is possible!
                   01010 : 8,95 + 2,23 min
                   10101 : 17,89 + 4,47 + 1,12 min"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "GC_HELIUM_TANK"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 223
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "GC: Helium tank selected
                Possible values :
                   Tank 1
                   Tank 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_DUR_INJEC"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 231
 BYTES       = 8
 UNIT        = MILLISECOND
 FORMAT      = I8
 DESCRIPTION = "GC: Duration of injection (msec)"
END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "GC_SAMPLE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 241
 BYTES       = 15
 UNIT        = "N/A"
 DESCRIPTION = "GC: Sample
                Possible values :
                   Calibration gas
                   Oven
                   Tenax"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_1"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 258
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 1
                  Column #1  0x000i (0 <= i <= 7)
                  Column #2  0x00i0 (0 <= i <= 7)
                  Column #3  0x0i00 (0 <= i <= 7)
                  Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_2"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 260
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 2
                   Column #1  0x000i (0 <= i <= 7)
                   Column #2  0x00i0 (0 <= i <= 7)
                   Column #3  0x0i00 (0 <= i <= 7)
                   Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_3"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 262
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 3
                  Column #1  0x000i (0 <= i <= 7)
                  Column #2  0x00i0 (0 <= i <= 7)
                  Column #3  0x0i00 (0 <= i <= 7)
                  Column #4  0xi000 (0 <= i <= 7)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CHANNEL_4"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 264
 BYTES       = 1
 UNIT        = "N/A"
 DESCRIPTION = "GC: Column selection for Channel 4
                   Column #1  0x000i (0 <= i <= 7)
```

```
                    Column #2  0x00i0 (0 <= i <= 7)
                    Column #3  0x0i00 (0 <= i <= 7)
                    Column #4  0xi000 (0 <= i <= 7)"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "GC_COL_HEAD_PRESS"
  DATA_TYPE    = CHARACTER
  START_BYTE   = 267
  BYTES        = 4
  UNIT         = "N/A"
  DESCRIPTION  = "(Hexadecimal Format) GC: Column head pressure
                  0x0000 <= x <= 0x00ff"
 END_OBJECT    = COLUMN


/* CSIB_PAR */
/*       Device parameters and experiment parameters for MS and GC          */

/*   ---------------     Device parameters   (27 words)   ---------------  */

 OBJECT        = COLUMN
  NAME         = "TPST_POS_OPEN"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 273
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Open"
 END_OBJECT    = COLUMN


 OBJECT        = COLUMN
  NAME         = "TPST_POS_CONT_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 282
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Contacts Closed"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_POS_MAIN_TERM_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 291
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Main Terminal Closed"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TPST_POS_SIDE_TERM_CLOS"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 300
  BYTES        = 8
  UNIT         = "N/A"
  FORMAT       = I8
  DESCRIPTION  = "TPST: Position Side Terminal Closed"
 END_OBJECT    = COLUMN
```

```
OBJECT        = COLUMN
 NAME         = "TPST_POS_UPPER"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 309
 BYTES        = 8
 UNIT         = "N/A"
 FORMAT       = I8
 DESCRIPTION  = "TPST: Position Upper"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_POS_LOWER"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 318
 BYTES        = 8
 UNIT         = "N/A"
 FORMAT       = I8
 DESCRIPTION  = "TPST: Position Lower"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_BACKUP_RAM"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 328
 BYTES        = 3
 UNIT         = "N/A"
 DESCRIPTION  = "TPST: Use of Backup Ram ; possible values :
                        yes
                        no"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_IGN_SD2 STAT"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 334
 BYTES        = 3
 UNIT         = "N/A"
 DESCRIPTION  = "TPST: Ignore SD2 Status  ; possible values :
                        yes
                        no"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_TIMEOUT_VALUE"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 339
 BYTES        = 8
 UNIT         = "MILLISECOND"
 FORMAT       = I8
 DESCRIPTION  = "TPST: Timeout Value"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_CREATE_REPORT"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 349
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format)  TPST: Create Report"
END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "TEMPERATURE_0"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 356
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_1"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 363
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_2"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 370
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_3"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 377
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[3]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_4"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 384
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[4]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_5"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 391
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[5]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_6"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 398
 BYTES       = 4
 UNIT        = "N/A"
```

```
 DESCRIPTION = "(Hexadecimal Format) Temperature[6]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TEMPERATURE_7"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 405
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) Temperature[7]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_0"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 412
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_1"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 419
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_2"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 426
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_3"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 433
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[3]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_4"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 440
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format)  Heating Time[4]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HEATING_TIME_5"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 447
```

```
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format)  Heating Time[5]"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "HEATING_TIME_6"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 454
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format)  Heating Time[6]"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "HEATING_TIME_7"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 461
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format)  Heating Time[7]"
 END_OBJECT   = COLUMN


/*   ---------------  Experiment parameters MS    (18 words) -----------  */

 OBJECT       = COLUMN
  NAME        = "MS_DURATION"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 468
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Duration
                 Basically, itœs a timing information, but it varies
                 according to the programmed frequency:
                     Bit        1 kHz         4 kHz
                      3          67,1 s       16,8 s
                      2          33,5 s        8,4 s
                      1          16,8 s        4,19 s
                      0          8,4 s         2,1 s
                 Please note: any combination is possible:
                  0x7 at 1kHz = 33,5 + 16,8 + 8,4 s
                  0x7 at 4kHz = 8,4 + 4,19 + 2,1 s"

 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_USE_AUTO_CAL_VAL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 475
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Use auto calibration values
                   possible values :
                        True
                        False"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_PRESSURE_CAL_GAS"
  DATA_TYPE   = ASCII_INTEGER
```

```
 START_BYTE  = 482
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "(Hexadecimal Format) MS: Pressure calibration gas"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_MODE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 492
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: Mode  ; possible values :
                       Single
                       Multi"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_GAS_FLOW_DELAY"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 501
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: Gas Flow Delay"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_0]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 508
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[0]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_1]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 515
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[1]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_2]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 522
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[2]"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_U_3]"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 529
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal Format) MS: U[3]"
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_0]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 536
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[0]
                 Counter with 31,25 ms/cnt "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_1]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 543
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[1]
                 Counter with 31,25 ms/cnt "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_2]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 550
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[2]
                 Counter with 31,25 ms/cnt "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_3]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 557
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[3]
                 Counter with 31,25 ms/cnt "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_4]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 564
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[4]"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_T_5]"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 571
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal Format) MS: T[5]
                 Counter with 31,25 ms/cnt "
END_OBJECT    = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "MS_T_6]"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 578
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: T[6]
                 Counter with 31,25 ms/cnt "
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_DET_START_DEL"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 585
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Detector Start Delay
                 This is an integer with the following  bit allocation:
                     Bit          Sampling time delay in microseconds
                      3             256
                      2             128
                      1             64
                      0             32 "
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_WORDS_SC_DATA"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 592
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "(Hexadecimal Format) MS: Words to copy from Science Data"
 END_OBJECT   = COLUMN


/* ---------------     Experiment parameters GC (10 words) -------------  */


 OBJECT       = COLUMN
  NAME        = "GC_TEMP_COL_0"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 598
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = I8
  DESCRIPTION = "GC: Temperature Column 0"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "GC_TEMP_COL_1"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 607
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = I8
  DESCRIPTION = "GC: Temperature Column 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "GC_TEMP_COL_2"
  DATA_TYPE   = ASCII_INTEGER
```

```
 START_BYTE  = 616
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_3"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 625
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 3"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_4"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 634
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_5"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 643
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 5"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_6"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 652
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "Temperature Column 6"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_TEMP_COL_7"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 661
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = I8
 DESCRIPTION = "GC: Temperature Column 7"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_WORDS_SC_DATA"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 670
```

```
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = I8
  DESCRIPTION = "GC: Words to copy from Science Data"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "GC_TIME_TENAX"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 679
  BYTES       = 8
  UNIT        = SECOND
  FORMAT      = I8
  DESCRIPTION = "GC: Time to heat Tenax (sec)"
 END_OBJECT   = COLUMN
```

4.3.2.3.2 The description of the TIME table (flight software version previous to 1.8)

```
  OBJECT                  = COSAC_TIME_ID_TABLE
      NAME                = TIME_ID
      INTERCHANGE_FORMAT  = ASCII
      ROWS                = 1
      ^STRUCTURE          = "COSAC_TIME_ID.FMT"
      COLUMNS             = 2
      ROW_BYTES           = 15
  END_OBJECT              = COSAC_TIME_ID_TABLE
```

The structure of the TABLE object is described in the file COSAC_TIME_ID.FMT as follows:

```
/*          Contents of format file  "COSAC_TIME_ID.FMT"          */

 OBJECT                = COLUMN
   NAME                = "HIGH_LOBT"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 2
   BYTES               = 4
   DESCRIPTION         = "HIGH_LOBT in Hexadecimal format"
   UNIT                = "N/A"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "LOW_LOBT"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 9
   BYTES               = 4
   UNIT                = "N/A"
   DESCRIPTION         = "LOW_LOBT in Hexadecimal format"
 END_OBJECT            = COLUMN
```

4.3.2.3.3 The description of the FULL_HK table:

```
  OBJECT                  = COSAC_FULL_HK_TABLE
      NAME                = FULL_HK_ID
      INTERCHANGE_FORMAT  = ASCII
      ROWS                = 1
      ^STRUCTURE          = "COSAC_FULL_HK_SC.FMT"
      COLUMNS             = 92
```

```
     ROW_BYTES              = 790
  END_OBJECT                = COSAC_FULL_HK_TABLE
```

The structure of the TABLE object is described in the file COSAC_FULL_HK_SC.FMT as follows:

```
/*       Contents of format file  "COSAC_FULL_HK_SC.FMT"               */

/*   ---------------------------------------------------------------   */
/*                     Values delivered to CDMS (64)                   */
/*   ---------------------------------------------------------------   */
/*      ...................  DPU  ..............................    */

 OBJECT       = COLUMN
  NAME        = "P5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 1
  BYTES       = 8
  UNIT        = MILLIAMPERE
  FORMAT      = "F8.2"
  DESCRIPTION = "CURRENT +5V LINE"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "M5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 10
  BYTES       = 8
  FORMAT      = "F8.2"
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT -5V LINE"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "P12V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 19
  BYTES       = 8
  UNIT        = MILLIAMPERE
  FORMAT      = "F8.2"
  DESCRIPTION = "CURRENT +12V LINE"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "M12V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 28
  BYTES       = 8
  UNIT        = MILLIAMPERE
  FORMAT      = "F8.2"
  DESCRIPTION = "CURRENT -12V LINE"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "SYSTEM_POWER"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 37
```

```
 BYTES       = 8
 UNIT        = WATT
 FORMAT      = "F8.2"
 DESCRIPTION = "SYSTEM POWER "
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "GC_ADC_INPUT"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 46
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "GC ADC INPUT"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "MS_ADC_INPUT"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 55
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "MS ADC INPUT"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "CHAN7_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 64
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 7"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN8_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 73
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 8"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN9_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 82
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 9"
 FORMAT      = "I8"
END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "CHAN10_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 91
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 10"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "CHAN11_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 100
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 11"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN12_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 109
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 12 "
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "CHAN13_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 118
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 13"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "CHAN14_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 127
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 14"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "DPU_VOLTAGE"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 136
 BYTES       = 8
 UNIT        = VOLT
```

```
  FORMAT      = "F8.2"
  DESCRIPTION = "VOLTAGE DPU"
 END_OBJECT   = COLUMN

/*      ...................  GC  ..............................    */

 OBJECT       = COLUMN
  NAME        = "HE1_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 145
  BYTES       = 10
  UNIT        = MILLIBAR
  FORMAT      = "I10"
  DESCRIPTION = "Pressure He Tank 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "HE2_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 156
  BYTES       = 10
  UNIT        = MILLIBAR
  FORMAT      = "I10"
  DESCRIPTION = "Pressure He Tank 2"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "IONS_MS_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 167
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = "I8"
  DESCRIPTION = "Pressure Ion Source MS"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "GCBOARD2_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 176
  BYTES       = 8
  UNIT        = KELVIN
  FORMAT      = "F8.2"
  DESCRIPTION = "Temperature GC-Board2 "
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "TENAX_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 185
  BYTES       = 8
  UNIT        = KELVIN
  FORMAT      = "F8.2"
  DESCRIPTION = "Temperature Tenax"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "HE_SEC_PRESSURE"
```

```
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 194
 BYTES       = 8
 UNIT        = MILLIBAR
 FORMAT      = "F8.2"
 DESCRIPTION = "Secondary pressure HE)"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "VALVE_VOLTAGE"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 203
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "Voltage valve unit"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN1_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 212
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 1)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN2_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 221
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN3_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 230
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 3"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN4_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 239
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 4"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
```

```
  NAME         = "COLUMN5_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 248
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Column 5"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "COLUMN6_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 257
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Column 6"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "COLUMN7_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 266
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Column 7"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "COLUMN8_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 275
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Column 8)"
 END_OBJECT    = COLUMN

/*      ..................  MS  ............................    */

 OBJECT        = COLUMN
  NAME         = "PIPEA_M_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 284
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Pipe a (main)"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "PIPEB_M_TEMP"
  DATA_TYPE    = ASCII_REAL
  START_BYTE   = 293
  BYTES        = 8
  UNIT         = KELVIN
  FORMAT       = "F8.2"
  DESCRIPTION  = "Temperature Pipe b (side)"
 END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "OVEN_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 302
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Oven"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MSEBOX_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 311
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature MS-EBox)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CALGAS_PRESSURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 320
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Pressure Calibration Gas"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POSITION"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 329
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Position Tapping Station
               Open >= 4500,
               OT (Oberer Totpunkt/Top dead centre) ~ 4710,
               UT (Unterer Totpunkt/bottom dead centre) ~ 1330)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "EMISSION_CURRENT"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 338
 BYTES       = 8
 UNIT        = NANOAMPERE
 FORMAT      = "F8.2"
 DESCRIPTION = "Emission current"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV1_DET_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 347
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 1, U detector"
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV2_REFL2_4_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 356
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 2, U reflector2_4"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV3_REFL2_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 365
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 3, U reflector 2"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV4_REFL1_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 374
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 4, U reflector 1"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV5_LENSE2_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 383
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 5, U lense 2"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV6_LENSE1_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 392
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 6, U lense 1"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_HV7_G3_V"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 401
 BYTES        = 8
 UNIT         = VOLT
 FORMAT       = "F8.2"
 DESCRIPTION  = "MS HV 7, U G3"
END_OBJECT    = COLUMN
```

```
/*      ..................  OS  ............................    */

 OBJECT        = COLUMN
  NAME         = "REC_CDMS_MSG"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 410
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Counter for received CDMS messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "TRANS_CDMS_MSG"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 417
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Counter for transmit CDMS messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "STAT_CDMS_MSG"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 424
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Counter for CDMS status messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "STORED_MSG"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 431
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Counter for stored messages (TCs)"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "RERC_MSG"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 438
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Counter for RERC messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "LAST_SSIF_ERROR"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 445
  BYTES        = 6
  UNIT         = "N/A"
  FORMAT       = "I6"
  DESCRIPTION  = "Last received SSIF error code)"
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "LOBT_HIGH"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 453
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "LOBT, high in Hexadecimal Format"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "LOBT_LOW"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 460
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "LOBT, low in Hexadecimal Format"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "BRAM_POINTER"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 466
 BYTES        = 6
 UNIT         = "N/A"
 FORMAT       = "I6"
 DESCRIPTION  = "BackupRAM pointer"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "PHECOPY"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 473
 BYTES        = 6
 UNIT         = "MILLIBAR"
 FORMAT       = "I6"
 DESCRIPTION  = "copy of Pressure HE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_CYCLES"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 480
 BYTES        = 6
 UNIT         = "N/A"
 FORMAT       = "I6"
 DESCRIPTION  = "MS cycles"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "GC_CYCLES"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 487
 BYTES        = 6
 UNIT         = "N/A"
 FORMAT       = "I6"
 DESCRIPTION  = "GC cycles"
END_OBJECT    = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "SYSSTATUS2"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 495
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "System Status 2 (Hexadecimal Format)
       Single Shot Valve: b01 = armed, b11 = fired
       HK auto collection: 0 = disabled, 1 = enabled
       MM dump: 0 = idle, 1 = in progress
       MM auto dump: 0 = disabled, 1 = enabled"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "SYSSTATUS1"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 502
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "System Status 1  (Hexadecimal Format)
    Configuration valid: bxx1 = TPST, bx1x = MS,  b1xx = GC
    Continue Flag (not supported)
    Waiting flag (not supported)
    System Mode: b000 = idle, b001 = GC, b010=MS, b011=GCMS, b100 = Self test
    Power Switch: bxxx1=pws1, bxx1x=pws2, bx1xx=pws3 (not used), b1xxx = pws4
    Mass Memory: 0 = off, 1 = on
    EEPROM Timestamp: 0 = okay, 1 = mismatch
    TPST direction changed: 0 = false, 1 = true
    SD2 ready flag: 0 = false, 1 = true"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "ERROR_MSG"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 508
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Error Message"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "TPST_LAST"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 515
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Last read position of TPST"
 END_OBJECT   = COLUMN

/*   ------------------------------------------------------------------   */
/*   Values used internally and added to the science data stream (42)     */
/*  -------------------------------------------------------------------   */

 OBJECT       = COLUMN
  NAME        = "ALLOC_BRAM_SIZE"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 523
  BYTES       = 4
  UNIT        = "N/A"
```

```
 DESCRIPTION = "(Hexadecimal format) Allocated BackupRAM size of Cosac
                inside CDMS memory 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CKECK_SC_PACKET"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 530
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Checksum of Science Data packet
                as received from CDMS 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "OFF_LEN_TC"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 537
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Offset & Length of stored TC,
                see CDMS SSpec; 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SCHED_SSIF_REQ"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 544
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Currently scheduled SSIF Request Code,
                 see CDMS SSpec; 0x0000 <= x <= 0x0a"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "LAST_CDMS_SSS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 551
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) last CDMS Service System Status,
                see CDMS SSpec; 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "LAST_CDMS_MODE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 558
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)last CDMS Mode (RMOD)
                   CDMS Mode
                   SSCLK Frequency
                   Current AMST ID"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TRIGGER_WORD"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 565
```

```
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = " (Hexadecimal format) Trigger word
                 Dest. Unit Trigger Word Field"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "ALLOC_SC_VOL"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 572
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Allocated Science Data Volume,
                see CDMS SSpec; 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "$MMFIRSTINIT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 579
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "First init. of Mass Memory needed
                Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$MMRDCNTHIGHMASS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 587
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Memory read counter high address
                0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$MMRDCNTLOWMASS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 594
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) Memory read counter low address,
                0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MMADRHMASS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 601
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) MMADRHMass Memory SW addr counter,high"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "MMADRLMASS"
```

```
 DATA_TYPE   = CHARACTER
 START_BYTE  = 608
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)  Memory SW addr counter, low"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MM$FLUSH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 615
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "Flag if MM flush is needed
               Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$RFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 623
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)   Frame read index
                 0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$WFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 630
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)  Frame write index
                0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$PFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 637
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)  current Frame index
                0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$RMMFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 644
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format)  Mass Memory frame read index
                0x0000 <= x <= 0xffff"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$WMMFR"
```

```
 DATA_TYPE    = CHARACTER
 START_BYTE   = 651
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal format)  Mass Memory frame write index
                 0x0000 <= x <= 0xffff"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$PMMFR"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 658
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal format)  current Mass Memory frame index
                 0x0000 <= x <= 0xffff"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$IDLECNT"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 665
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal format) Idle task counter
                 0x0000 <= x <= 0xffff"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$SD2STATUS"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 672
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal format) Copy of SD2 carousel status,
                  0xf000 = SD2 Ready"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$MMDUMP"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 679
 BYTES        = 5
 UNIT         = "N/A"
 DESCRIPTION  = "Mass Memory auto-dump
                 Possible values :
                 false
                 true"
END_OBJECT    = COLUMN


OBJECT        = COLUMN
 NAME         = "TDCMODE"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 687
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "(Hexadecimal format) Mode in which the TDC is operated in"
END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "$DPUADR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 694
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "(Hexadecimal format) First faulty address of DPU memory,
                default : 0X0000"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$EODATA"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 701
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "Create OCPL when MM empty,
                Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$EOM"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 709
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "End of measurement,
                Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$TDCSKIP"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 717
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "TDC produced time-out,
                Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$GCSKIP"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 725
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "GC produced time-out,
                Possible values :
                false
                true"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GVSTAC.RESULT"
```

```
  DATA_TYPE   = CHARACTER
  START_BYTE  = 733
  BYTES       = 3
  UNIT        = "N/A"
  DESCRIPTION = "Result of last action,
                 Possible values :
                 OK
                 NOK"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "SER_SYS_STAT"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 739
  BYTES       = 49
  UNIT        = "N/A"
  DESCRIPTION = "Copy of CDMS Service System Status ; see CDMS SSpec
                 (String of 10 word in Hexadecimal format;
                  each word separated by a space)"
  END_OBJECT   = COLUMN
```

4.3.2.3.4 The description of the HK_BURST table (flight software 1.8):

```
  OBJECT                    = COSAC_HK_BURST_TABLE
      NAME                  = HK_BURST_ID
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  =
      ^STRUCTURE            = "COSAC_HK_BURST.FMT"
      COLUMNS               =
      ROW_BYTES             =
  END_OBJECT                = COSAC_HK_BURST_TABLE
```

The structure of the TABLE object is described in the file COSAC_HK_BURST.FMT as follows:

```
/*       Contents of format file  "COSAC_HK_BURST.FMT"              */
/* valid for flight software V 1.8 uploaded at PC 10,            */
/*  2009-09-23T22:00:00 UTC                                      */

/*      ...................  DPU  ..............................    */

 OBJECT       = COLUMN
  NAME        = "P5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 1
  BYTES       = 9
  UNIT        = MILLIAMPERE
  FORMAT      = "F9.2"
  DESCRIPTION = "CURRENT +5V LINE"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "M5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 11
  BYTES       = 9
  FORMAT      = "F9.2"
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT -5V LINE"
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "P12V_C"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 21
 BYTES        = 9
 UNIT         = MILLIAMPERE
 FORMAT       = "F9.2"
 DESCRIPTION  = "CURRENT +12V LINE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "M12V_C"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 31
 BYTES        = 9
 UNIT         = MILLIAMPERE
 FORMAT       = "F9.2"
 DESCRIPTION  = "CURRENT -12V LINE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "SYSTEM_POWER"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 41
 BYTES        = 9
 UNIT         = WATT
 FORMAT       = "F9.2"
 DESCRIPTION  = "SYSTEM POWER "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "GC_ADC_INPUT"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 51
 BYTES        = 8
 UNIT         = "N/A"
 FORMAT       = "I8"
 DESCRIPTION  = "GC ADC INPUT"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "MS_ADC_INPUT"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 60
 BYTES        = 8
 UNIT         = "N/A"
 FORMAT       = "I8"
 DESCRIPTION  = "MS ADC INPUT"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "CHAN7_DPU_MUX"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 69
 BYTES        = 8
 UNIT         = "N/A"
 FORMAT       = "I8"
 DESCRIPTION  = "DPU MUX CHANNEL 7"
END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "CHAN8_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 78
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 8"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "CHAN9_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 87
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 9"
 FORMAT      = "I8"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN10_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 96
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 10"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN11_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 105
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 11"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN12_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 114
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 12 "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CHAN13_DPU_MUX"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 123
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "DPU MUX CHANNEL 13"
END_OBJECT   = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "CHAN14_DPU_MUX"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 132
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = "I8"
  DESCRIPTION = "DPU MUX CHANNEL 14"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "DPU_VOLTAGE"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 141
  BYTES       = 9
  UNIT        = VOLT
  FORMAT      = "F9.2"
  DESCRIPTION = "VOLTAGE DPU"
 END_OBJECT   = COLUMN

/*      ...................  GC  ..............................    */

 OBJECT       = COLUMN
  NAME        = "HE1_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 151
  BYTES       = 10
  UNIT        = MILLIBAR
  FORMAT      = "I10"
  DESCRIPTION = "Pressure He Tank 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "HE2_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 162
  BYTES       = 10
  UNIT        = MILLIBAR
  FORMAT      = "I10"
  DESCRIPTION = "Pressure He Tank 2"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "IONS_MS_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 173
  BYTES       = 8
  UNIT        = "N/A"
  FORMAT      = "I8"
  DESCRIPTION = "Pressure Ion Source MS"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "GCBOARD2_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 182
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature GC-Board2 "
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TENAX_TEMP"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 192
 BYTES        = 9
 UNIT         = KELVIN
 FORMAT       = "F9.2"
 DESCRIPTION  = "Temperature Tenax"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "HE_SEC_PRESSURE"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 202
 BYTES        = 9
 UNIT         = MILLIBAR
 FORMAT       = "F9.2"
 DESCRIPTION  = "Secondary pressure HE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "VALVE_VOLTAGE"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 212
 BYTES        = 9
 UNIT         = VOLT
 FORMAT       = "F9.2"
 DESCRIPTION  = "Voltage valve unit"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "COLUMN1_TEMP"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 222
 BYTES        = 9
 UNIT         = KELVIN
 FORMAT       = "F9.2"
 DESCRIPTION  = "Temperature Column 1"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "COLUMN2_TEMP"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 232
 BYTES        = 9
 UNIT         = KELVIN
 FORMAT       = "F9.2"
 DESCRIPTION  = "Temperature Column 2"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "COLUMN3_TEMP"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 242
 BYTES        = 9
 UNIT         = KELVIN
 FORMAT       = "F9.2"
 DESCRIPTION  = "Temperature Column 3"
END_OBJECT    = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "COLUMN4_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 252
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature Column 4"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "COLUMN5_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 262
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature Column 5"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "COLUMN6_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 272
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature Column 6"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "COLUMN7_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 282
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature Column 7"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "COLUMN8_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 292
  BYTES       = 9
  UNIT        = KELVIN
  FORMAT      = "F9.2"
  DESCRIPTION = "Temperature Column 8"
 END_OBJECT   = COLUMN

/*      ..................  MS  ..............................    */

 OBJECT       = COLUMN
  NAME        = "PIPEA_MAIN_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 302
  BYTES       = 9
  UNIT        = KELVIN
```

```
 FORMAT      = "F9.2"
 DESCRIPTION = "Temperature Pipe a (main)"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "PIPEB_SIDE_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 312
 BYTES       = 9
 UNIT        = KELVIN
 FORMAT      = "F9.2"
 DESCRIPTION = "Temperature Pipe b (side)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "OVEN_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 322
 BYTES       = 9
 UNIT        = KELVIN
 FORMAT      = "F9.2"
 DESCRIPTION = "Temperature Oven"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_EBOX_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 332
 BYTES       = 9
 UNIT        = KELVIN
 FORMAT      = "F9.2"
 DESCRIPTION = "Temperature MS-EBox"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CALGAS_PRESSURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 342
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Pressure Calibration Gas"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POSITION"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 351
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Position Tapping Station
               Open >= 4500,
               OT (Oberer Totpunkt/Top dead centre) ~ 4710,
               UT (Unterer Totpunkt/bottom dead centre) ~ 1330)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "EMISSION_CURRENT"
 DATA_TYPE   = ASCII_REAL
```

```
 START_BYTE  = 360
 BYTES       = 9
 UNIT        = NANOAMPERE
 FORMAT      = "F9.2"
 DESCRIPTION = "Emission current"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV1_U_DETECTOR"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 370
 BYTES       = 9
 UNIT        = VOLT
 FORMAT      = "F9.2"
 DESCRIPTION = "MS HV 1, U detector"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV2_U_REFLECTOR2_4"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 380
 BYTES       = 9
 UNIT        = VOLT
 FORMAT      = "F9.2"
 DESCRIPTION = "MS HV 2, U reflector2_4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV3_U_REFLECTOR2"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 390
 BYTES       = 9
 UNIT        = VOLT
 FORMAT      = "F9.2"
 DESCRIPTION = "MS HV 3, U reflector 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV4_U_REFLECTOR1"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 400
 BYTES       = 9
 UNIT        = VOLT
 FORMAT      = "F9.2"
 DESCRIPTION = "MS HV 4, U reflector 1"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV5_U_LENSE2"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 410
 BYTES       = 9
 UNIT        = VOLT
 FORMAT      = "F9.2"
 DESCRIPTION = "MS HV 5, U lense 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV6_U_LENSE1"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 420
```

```
  BYTES       = 9
  UNIT        = VOLT
  FORMAT      = "F9.2"
  DESCRIPTION = "MS HV 6, U lense 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_HV7_U_G3"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 430
  BYTES       = 9
  UNIT        = VOLT
  FORMAT      = "F9.2"
  DESCRIPTION = "MS HV 7, U G3"
 END_OBJECT   = COLUMN

/*      ...................  OS  ..............................    */

 OBJECT       = COLUMN
  NAME        = "CNT_MS_HV_FAILURES"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 440
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for MS HV failures"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_CDMS_REQ_TIME_OUT"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 444
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for received CDMS requests time-outs"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_TSCR_SSIF_MSG"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 448
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Counter for transmit TSCR SSIF messages"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_STAT_CDMS_MSG"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 455
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Counter for CDMS status messages"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_STORED_MSG"
  DATA_TYPE   = ASCII_INTEGER
```

```
  START_BYTE  = 462
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for stored messages (TCs)"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_INT4"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 466
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for INT4"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_TC_ERR"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 470
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for TC checksum errors"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CNT_RERC_MSG"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 474
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Counter for RERC messages"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "LAST_SSIF_ERROR"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 478
  BYTES       = 3
  UNIT        = "N/A"
  FORMAT      = "I3"
  DESCRIPTION = "Last received SSIF error code"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "LOBT_5_MSBITS"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 483
  BYTES       = 2
  UNIT        = "N/A"
  DESCRIPTION = "Timestamp of HK update
                 LOBT 5 upper bits (hexadecimal)"
 END_OBJECT   = COLUMN

OBJECT       = COLUMN
  NAME        = "LOBT_HIGH"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 488
```

```
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Timestamp of HK update
                LOBT most significant word in Hexadecimal Format"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "LOBT_LOW"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 495
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Timestamp of HK update
                LOBT least significant word in Hexadecimal Format"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "PRESS_HE_COPY"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 501
 BYTES       = 6
 UNIT        = "MILLIBAR"
 FORMAT      = "I6"
 DESCRIPTION = "copy of Pressure HE (updated during GC start)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_CYCLES"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 508
 BYTES       = 3
 UNIT        = "N/A"
 FORMAT      = "I3"
 DESCRIPTION = "MS cycles"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_CYCLES"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 512
 BYTES       = 3
 UNIT        = "N/A"
 FORMAT      = "I3"
 DESCRIPTION = "GC cycles"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_SINGLE_SHOT_VALVE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 517
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
                Single Shot Valve status.
                The possible values are:
                ARMED or FIRED "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_COMPRESSION"
 DATA_TYPE   = CHARACTER
```

```
 START_BYTE  = 525
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
               The possible values are:
               GC or/and MS"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_UNIT_ON"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 533
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
               The possible values are:
               GC or/and MS"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_TEXT_FRAMES"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 541
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
               The possible values are:
               DISABLED or ENABLED"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_TPST_COR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 552
 BYTES       = 3
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
               TPST correction
               The possible values are:
               YES or NO "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_HK_RATE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 558
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
               The possible values are:
               HIGH or LOW
               Low rate means CDMS HK."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT2_HK_AUTO"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 565
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2.
```

```
                HK auto collection.
                The possible values are:
                DISABLED or ENABLED"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "STAT2_MM_DUMP"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 576
 BYTES        = 11
 UNIT         = "N/A"
 DESCRIPTION  = "System Status 2
                The possible values are:
                IDLE or IN PROGRESS"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "STAT2_MM_AUTO_DUMP"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 590
 BYTES        = 8
 UNIT         = "N/A"
 DESCRIPTION  = "System Status 2
                The possible values are:
                DISABLED or ENABLED"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "STAT1_VALID_CONFP"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 601
 BYTES        = 10
 UNIT         = "N/A"
 DESCRIPTION  = "System Status 1
                The possible values are:
                TPST and/or MS and/or GC"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "STAT1_ADC_TIMEOUT"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 614
 BYTES        = 3
 UNIT         = "N/A"
 DESCRIPTION  = "System Status 1
                The possible values are:
                NO or YES"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "STAT1_SYS_MODE"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 620
 BYTES        = 8
 UNIT         = "N/A"
 DESCRIPTION  = "System Status 1
                System mode.
                The possible values are:
                IDLE, GC, MS, GCMS or SELFTEST"
END_OBJECT    = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "STAT1_POWER_SWITCH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 631
 BYTES       = 19
 UNIT        = "N/A"
 DESCRIPTION = "System Status 1
               The possible values are:
               PWS1 and/or PWS2 and/or PWS3 and/or PWS4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT1_MASS_MEM"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 653
 BYTES       = 3
 UNIT        = "N/A"
 DESCRIPTION = "System Status 1
               Mass memory status.
               The possible values are:
               OFF or ON"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT1_EEPROM_TIMESTAMP"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 659
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "System Status 1
               The possible values are:
               OK or MISMATCH"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT1_TPST_DIR_CHNG"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 670
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "System Status 1.
               Whether TPST direction changed.
               The possible values are:
               TRUE or FALSE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "STAT1_SD2_READY"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 678
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "System Status 1
               SD2 ready flag.
               The possible values are:
               FALSE or TRUE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "ERROR_MSG"
 DATA_TYPE   = ASCII_INTEGER
```

```
  START_BYTE  = 685
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Error Message"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "TPST_LAST_POS"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 692
  BYTES       = 6
  UNIT        = "N/A"
  FORMAT      = "I6"
  DESCRIPTION = "Last read position of TPST"
 END_OBJECT   = COLUMN


/*   ------------------------------------------------------------------   */
/*   Values used internally and added to the science data stream (42)     */
/*  -------------------------------------------------------------------   */

 OBJECT       = COLUMN
  NAME        = "ALLOC_BRAM_SIZE"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 700
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = " Allocated BackupRAM size of Cosac
                 inside CDMS memory 0x0000 <= x <= 0xffff (Hexadecimal)"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "CKECKSUM_SC_PACKET"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 707
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "Checksum of Science Data packet
                 as received from CDMS 0x0000 <= x <= 0xffff (Hexadecimal) "
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "STORED_TC_OFFSET_LEN"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 714
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = "Offset & Length of stored TC,
                 see CDMS SSpec; 0x0000 <= x <= 0xffff (Hexadecimal)"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "SCHED_SSIF_REQ"
  DATA_TYPE   = CHARACTER
  START_BYTE  = 721
  BYTES       = 4
  UNIT        = "N/A"
  DESCRIPTION = " Currently scheduled SSIF Request Code,
                  see CDMS SSpec; 0x0000 <= x <= 0x0a (Hexadecimal)"
 END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "LAST_CDMS_SSS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 728
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Last CDMS Service System Status,
                see CDMS SSpec; 0x0000 <= x <= 0xffff (hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "LAST_CDMS_MODE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 735
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Last CDMS Mode (hexadecimal)
                bits 15, 14:  CDMS Mode
                bits 13, 12:  SSCLK Frequency
                bits 11 to 0: Current AMST ID"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TRIGGER_WORD"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 742
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Trigger word (Hexadecimal )
                bits 15 to 11: destination unit
                bits 10 to 0:  trigger word field"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "ALLOC_SC_VOL"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 749
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Allocated Science Data Volume,
                  see CDMS SSpec; 0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$MMFIRSTINIT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 756
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "First init. of Mass Memory needed
                Possible values :
                FALSE
                TRUE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$MMRDCNTHIGH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 764
 BYTES       = 4
```

```
 UNIT        = "N/A"
 DESCRIPTION = "Memory read counter high address
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$MMRDCNTLOW"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 771
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Memory read counter low address,
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MMADRH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 778
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Mass Memory SW addr counter,high (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MMADRL"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 785
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Memory SW addr counter, low (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MM$FLUSH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 792
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "Flag if MM flush is needed
               Possible values :
                FALSE
                TRUE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$RFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 800
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Frame read index
                 0x0000 <= x <= 0xffff (Hexadecimal) "
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$WFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 807
 BYTES       = 4
 UNIT        = "N/A"
```

```
 DESCRIPTION = "Frame write index
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$PFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 814
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Current Frame index
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$RMMFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 821
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Mass Memory frame read index
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$WMMFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 828
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Mass Memory frame write index
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$PMMFR"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 835
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "current Mass Memory frame index
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$IDLECNT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 842
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Idle task counter
                0x0000 <= x <= 0xffff (Hexadecimal)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$SD2STATUS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 849
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Copy of SD2 carousel status,
```

```
                  0xf000 = SD2 Ready (Hexadecimal) "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$MMDUMP"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 856
 BYTES        = 5
 UNIT         = "N/A"
 DESCRIPTION  = "Mass Memory auto-dump
                 Possible values :
                 FALSE
                 TRUE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TDCMODE"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 864
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "Mode in which the TDC is operated in (Hexadecimal) "
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$DPUADR"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 871
 BYTES        = 4
 UNIT         = "N/A"
 DESCRIPTION  = "First faulty address of DPU memory,
                  default : 0X0000 (Hexadecimal)"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$EODATA"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 878
 BYTES        = 5
 UNIT         = "N/A"
 DESCRIPTION  = "Create OCPL when MM empty,
                 Possible values :
                 FALSE
                 TRUE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$EOM"
 DATA_TYPE    = CHARACTER
 START_BYTE   = 886
 BYTES        = 5
 UNIT         = "N/A"
 DESCRIPTION  = "End of measurement,
                 Possible values :
                 FALSE
                 TRUE"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "$TDCSKIP"
 DATA_TYPE    = CHARACTER
```

```
 START_BYTE  = 894
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "TDC produced time-out,
                Possible values :
                FALSE
                TRUE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$GCSKIP"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 902
 BYTES       = 5
 UNIT        = "N/A"
 DESCRIPTION = "GC produced time-out,
                Possible values :
                FALSE
                TRUE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GVSTAC.RESULT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 910
 BYTES       = 3
 UNIT        = "N/A"
 DESCRIPTION = "Result of last action,
                Possible values :
                OK
                NOK"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SERV_SYS_STAT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 916
 BYTES       = 49
 UNIT        = "N/A"
 DESCRIPTION = "Copy of CDMS Service System Status ; see CDMS SSpec
                (String of 10 word in Hexadecimal format;
                 each word separated by a space)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$HKREQUEST"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 968
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "HK request (hexadecimal).
                Set by HK Interrupt, when frame count
                reached 64 and 128"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$TIME.HIGH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 975
 BYTES       = 4
 UNIT        = "N/A"
```

```
 DESCRIPTION = "COSAC on-board time in milliseconds
                after boot (most significant word, hexadecimal)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$TIME.LOW"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 982
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "COSAC on-board time in milliseconds
                after boot (least significant word, hexadecimal)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$SRTIMEOUTS"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 989
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Number of Service Request timeouts."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "$HK32MSEC"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 996
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = " hexadecimal"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SW_OFF_TIME_HIGH"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1003
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Time (most significant word) when SW will automatically
                switch off any HW unit (hexadecimal)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SW_OFF_TIME_LOW"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1010
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Time (least significant word) when SW will automatically
                switch off any HW unit (hexadecimal)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SW_IDLE_DURATION"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1017
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Constant used to calculate swOFFTime (hexadecimal)."
END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "$HK_HIGH_RATE"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1024
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Flag indicating SW is configured to run in
                high HK rate mode (hexadecimal)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_INIT"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1031
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Pointer (hexadecimal) to function used during MS
                initilization (SETC, wrd 8)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "DET_TIME"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1038
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Time delay (hexadecimal) used during modification
               of detector voltage (ms) (SETC, wrd 9)."
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "IE_TIME"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1045
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Time delay (hexadecimal) used during modification of
               emission current (ms) (SETC, wrd 9)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "PIRANI_OFFSET"
 DATA_TYPE   = CHARACTER
 START_BYTE  = 1052
 BYTES       = 4
 UNIT        = "N/A"
 DESCRIPTION = "Offset (hexadecimal) found during binary search
                at system boot"
END_OBJECT   = COLUMN
```

4.3.2.3.5 GC Data Object Definition

The following TABLE objects are included in a complete GC measurement for flight software version previous to 1.8:

```
COSAC_CONFIG_TABLE
COSAC_FULL_HK_TABLE
COSAC_TIME_TABLE
COSAC_ADC_GC_TABLE
COSAC_GC_SPECTRUM_2_TABLE (for CODMAC level 2)
COSAC_GC_SPECTRUM_3_TABLE (for CODMAC level 3)
```

The following TABLE objects are included in a complete GC measurement for flight software version 1.8:

```
COSAC_CONFIG_TABLE
COSAC_FULL_HK_TABLE
COSAC_HK_BURST_TABLE
COSAC_GC_SPECTRUM_TABLE (for CODMAC level 2)
COSAC_GC_SPECTRUM_TABLE (for CODMAC level 3)
```

The description of the ADC_GC table:

```
  OBJECT                    = COSAC_ADC_GC_TABLE
      NAME                  = ADC_GC
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 38
      ^STRUCTURE            = "COSAC_ADC_GC.FMT"
      COLUMNS               = 17
      ROW_BYTES             = 152
  END_OBJECT                = COSAC_ADC_GC_TABLE
```

The structure of the TABLE object is described in the file COSAC_ADC_GC.FMT as follows:

```
/*        Contents of format file  "COSAC_ADC_GC.FMT"                        */

 /* index of the cycle, and the tag inside the cycle */
 OBJECT       = COLUMN
  NAME        = "CYCLE_INDEX"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 1
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "Index of the cycle containing the ADC_GC_ID tag"
 END_OBJECT   = COLUMN

  OBJECT       = COLUMN
  NAME        = "INSIDE_CYCLE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 7
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "Index of ADC_GC_ID tag in the same cycle"
 END_OBJECT   = COLUMN
/*    ..................  GC  (16 parameters)  .......................    */

 OBJECT       = COLUMN
  NAME        = "HE1_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 13
  BYTES       = 10
  UNIT        = MILLIBAR
  FORMAT      = "I10"
  DESCRIPTION = "Pressure He Tank 1"
 END_OBJECT   = COLUMN


 OBJECT       = COLUMN
  NAME        = "HE2_PRESSURE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 24
  BYTES       = 10
  UNIT        = MILLIBAR
```

```
 FORMAT      = "I10"
 DESCRIPTION = "Pressure He Tank 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "IONS_MS_PRESSURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 35
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Pressure Ion Source MS (Hexadecimal format)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GCBOARD2_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 44
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature GC-Board2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TENAX_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 53
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Tenax"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "HE_SEC_PRESSURE"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 62
 BYTES       = 8
 UNIT        = MILLIBAR
 FORMAT      = "F8.2"
 DESCRIPTION = "Secondary pressure HE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "VALVE_VOLTAGE"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 71
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "Voltage valve unit"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN1_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 80
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
```

```
 DESCRIPTION = "Temperature Column 1"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN2_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 89
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN3_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 98
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 3"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN4_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 107
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN5_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 116
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 5"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN6_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 125
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 6"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "COLUMN7_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 134
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Column 7"
```

```
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "COLUMN8_TEMP"
 DATA_TYPE    = ASCII_REAL
 START_BYTE   = 143
 BYTES        = 8
 UNIT         = KELVIN
 FORMAT       = "F8.2"
 DESCRIPTION = "Temperature Column 8"
END_OBJECT    = COLUMN
```

The description of the GC spectrum table:

For CODMAC level 2, flight software version previous to 1.8:

```
  OBJECT                      = COSAC_GC_SPECTRUM_2_TABLE
      NAME                    = GC_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 4096
      ^STRUCTURE              = "COSAC_GC_SPECTRUM_2.FMT"
      COLUMNS                 = 8
      ROW_BYTES               = 98
  END_OBJECT                  = COSAC_GC_SPECTRUM_2_TABLE
```

For CODMAC level 3, flight software version previous to 1.8:

```
  OBJECT                      = COSAC_GC_SPECTRUM_3_TABLE
      NAME                    = GC_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 2048
      ^STRUCTURE              = "COSAC_GC_SPECTRUM_3.FMT"
      COLUMNS                 = 8
      ROW_BYTES               = 98
  END_OBJECT                  = COSAC_GC_SPECTRUM_3_TABLE
```

For CODMAC level 2, flight software version 1.8:

```
  OBJECT                      = COSAC_GC_SPECTRUM_2_FM1_8_TABLE
      NAME                    = GC_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 4096
      STRUCTURE               = "COSAC_GC_SPECTRUM_2_FM1_8.FMT"
      COLUMNS                 = 12
      ROW_BYTES               = 162
  END_OBJECT                  = COSAC_GC_SPECTRUM_2_FM1_8_TABLE
```

For CODMAC level 3, flight software version 1.8:

```
  OBJECT                      = COSAC_GC_SPECTRUM_3_FM1_8_TABLE
      NAME                    = GC_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 4096
      ^STRUCTURE              = "COSAC_GC_SPECTRUM_3_FM1_8.FMT"
      COLUMNS                 = 12
      ROW_BYTES               = 162
  END_OBJECT                  = COSAC_GC_SPECTRUM_3_FM1_8_TABLE
```

The structure of the TABLE object is described in the file COSAC_GC_SPECTRUM_2.FMT as follows:

```
/*     Contents of format file  "COSAC_GC_SPECTRUM_2.FMT"    */
/* COSAC_GC_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "COLUMN_NUMBER"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 8
   BYTES                 = 19
   DESCRIPTION           = "Column Number for this Spectrum "
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_LOBT"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 30
   BYTES                 = 14
   DESCRIPTION           = "Spectrum LOBT ; LOBT IS REPRESENTED AS :
                            Reset number (integer starting at 1) / seconds.
                            Reset number 1 starts at 2003-01-01T00:00:00 UTC
                            The time resolution is 0.03125 s"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_UTC"
   DATA_TYPE             = TIME
   START_BYTE            = 46
   BYTES                 = 23
   DESCRIPTION           = "Spectrum UTC"
 END_OBJECT              = COLUMN

/*  COSAC_GC_SPECTRUM          */

 OBJECT                  = COLUMN
   NAME                  = "X_LOW"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 70
   BYTES                 = 8
   UNIT                  = "N/A"
   FORMAT                = "F8.6"
   DESCRIPTION           = "X low resolution"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "Y_LOW"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 79
   BYTES                 = 4
   UNIT                  = "N/A"
   DESCRIPTION           = "Y Low resolution"
 END_OBJECT              = COLUMN
```

```
 OBJECT                  = COLUMN
   NAME                  = "X_HIGH"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 84
   BYTES                 = 8
   UNIT                  = "N/A"
   FORMAT                = "F8.6"
   DESCRIPTION           = "X High resolution"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "Y_HIGH"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 93
   BYTES                 = 4
   UNIT                  = "N/A"
   DESCRIPTION           = "Y High resolution"
 END_OBJECT              = COLUMN
```

The structure of the TABLE object is described in the file COSAC_GC_SPECTRUM_3.FMT as follows:

```
/*          Contents of format file  "COSAC_GC_SPECTRUM_3.FMT"          */

/* COSAC_GC_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "COLUMN_NUMBER"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 8
   BYTES                 = 19
   DESCRIPTION           = "Column Number for this Spectrum "
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_LOBT"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 30
   BYTES                 = 14
   DESCRIPTION           = "Spectrum LOBT ; LOBT IS REPRESENTED AS :
                            Reset number (integer starting at 1) / seconds.
                            Reset number 1 starts at 2003-01-01T00:00:00 UTC
                            The time resolution is 0.03125 s"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_UTC"
   DATA_TYPE             = TIME
   START_BYTE            = 46
   BYTES                 = 23
   DESCRIPTION           = "Spectrum UTC"
```

```
 END_OBJECT              = COLUMN

/*  COSAC_GC_SPECTRUM          */

 OBJECT                  = COLUMN
   NAME                  = "X_LOW"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 70
   BYTES                 = 8
   UNIT                  = "SECOND"
   FORMAT                = "F8.6"
   DESCRIPTION           = "Time relative to spectrum start time for
                            low resolution"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "Y_LOW"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 79
   BYTES                 = 4
   UNIT                  = "N/A"
   DESCRIPTION           = "Y Low resolution"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "X_HIGH"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 84
   BYTES                 = 8
   UNIT                  = "SECOND"
   FORMAT                = "F8.6"
   DESCRIPTION           = "Time relative to spectrum start time for
                            high resolution"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "Y_HIGH"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 93
   BYTES                 = 4
   UNIT                  = "N/A"
   DESCRIPTION           = "Y High resolution"
 END_OBJECT              = COLUMN
```

The structure of the TABLE object is described in the file COSAC_GC_SPECTRUM_2_FM1_8.FMT as follows:

```
/*     Contents of format file  "COSAC_GC_SPECTRUM_2_FM1_8.FMT"    */
/* valid for flight software V 1.8 uploaded at PC 10,             */
/*  2009-09-23T22:00:00 UTC                                       */

/* COSAC_GC_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN
```

```
 OBJECT                = COLUMN
   NAME                = "COLUMN_NUMBER"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 8
   BYTES               = 19
   DESCRIPTION         = "Column Number for this Spectrum "
 END_OBJECT            = COLUMN

OBJECT                = COLUMN
   NAME                = "UTC_INJ"
   DATA_TYPE           = TIME
   START_BYTE          = 29
   BYTES               = 23
   DESCRIPTION         = "GC injection time (UTC in PDS standard format
                          YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "UTC_START"
   DATA_TYPE           = TIME
   START_BYTE          = 53
   BYTES               = 23
   DESCRIPTION         = "GC measurement start time (UTC in PDS standard
                          format YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "UTC_END"
   DATA_TYPE           = TIME
   START_BYTE          = 77
   BYTES               = 23
   DESCRIPTION         = "GC measurement end time (UTC in PDS standard
                          format YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COBT_INJ"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 102
   BYTES               = 8
   DESCRIPTION         = "GC injection COSAC on-board time (hexadecimal).
                          COBT replaces the LOBT in certain places used in
                          previous versions of the science data stream. Its
                          resolution is 1ms."
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COBT_START"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 113
   BYTES               = 8
   DESCRIPTION         = "GC measurement start time as COSAC on-board time
                          (hexadecimal).COBT replaces the LOBT in certain
                          places used in previous versions of the science
                          data stream. Its resolution is 1ms."
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COBT_END"
   DATA_TYPE           = CHARACTER
```

```
   START_BYTE           = 124
   BYTES                = 8
   DESCRIPTION          = "GC measurement end time as COSAC on-board time
                           (hexadecimal).COBT replaces the LOBT in certain
                           places used in previous versions of the science
                           data stream. Its resolution is 1ms."
 END_OBJECT             = COLUMN


/*  COSAC_GC_SPECTRUM          */


 OBJECT                 = COLUMN
   NAME                 = "X_LOW"
   DATA_TYPE            = ASCII_REAL
   START_BYTE           = 134
   BYTES                = 8
   UNIT                 = "N/A"
   FORMAT               = "F8.6"
   DESCRIPTION          = "X low resolution"
 END_OBJECT             = COLUMN

 OBJECT                 = COLUMN
   NAME                 = "Y_LOW"
   DATA_TYPE            = ASCII_INTEGER
   START_BYTE           = 143
   BYTES                = 4
   UNIT                 = "N/A"
   DESCRIPTION          = "Y Low resolution"
 END_OBJECT             = COLUMN

 OBJECT                 = COLUMN
   NAME                 = "X_HIGH"
   DATA_TYPE            = ASCII_REAL
   START_BYTE           = 148
   BYTES                = 8
   UNIT                 = "N/A"
   FORMAT               = "F8.6"
   DESCRIPTION          = "X High resolution"
 END_OBJECT             = COLUMN

 OBJECT                 = COLUMN
   NAME                 = "Y_HIGH"
   DATA_TYPE            = ASCII_INTEGER
   START_BYTE           = 157
   BYTES                = 4
   UNIT                 = "N/A"
   DESCRIPTION          = "Y High resolution"
 END_OBJECT             = COLUMN
```

The structure of the TABLE object is described in the file COSAC_GC_SPECTRUM_3_FM1_8.FMT as follows:

```
/*          Contents of format file  "COSAC_GC_SPECTRUM_3FM1_8.FMT"  */
/* valid for flight software V 1.8 uploaded at PC 10,              */
/*  2009-09-23T22:00:00 UTC                                        */

/* COSAC_GC_SPECTRUM_HEADER */
```

```
 OBJECT                = COLUMN
   NAME                = "SPECTRUM_NUMBER"
   DATA_TYPE           = ASCII_INTEGER
   START_BYTE          = 1
   BYTES               = 5
   DESCRIPTION         = "Spectrum Number"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COLUMN_NUMBER"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 8
   BYTES               = 19
   DESCRIPTION         = "Column Number for this Spectrum "
 END_OBJECT            = COLUMN

OBJECT                = COLUMN
   NAME                = "UTC_INJ"
   DATA_TYPE           = TIME
   START_BYTE          = 29
   BYTES               = 23
   DESCRIPTION         = "GC injection time (UTC in PDS standard format
                          YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "UTC_START"
   DATA_TYPE           = TIME
   START_BYTE          = 53
   BYTES               = 23
   DESCRIPTION         = "GC measurement start time (UTC in PDS
                          standard format YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "UTC_END"
   DATA_TYPE           = TIME
   START_BYTE          = 77
   BYTES               = 23
   DESCRIPTION         = "GC measurement end time (UTC in PDS standard
                          format YYYY-MM-DDThh:mm:ss.sss)"
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COBT_INJ"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 102
   BYTES               = 8
   DESCRIPTION         = "GC injection COSAC on-board time (hexadecimal).
                          COBT replaces the LOBT in certain places used in
                          previous versions of the science data stream. Its
                          resolution is 1ms."
 END_OBJECT            = COLUMN

 OBJECT                = COLUMN
   NAME                = "COBT_START"
   DATA_TYPE           = CHARACTER
   START_BYTE          = 113
   BYTES               = 8
   DESCRIPTION         = "GC measurement start time as COSAC on-board time
                          (hexadecimal).COBT replaces the LOBT in certain
```

```
                              places used in previous versions of the science
                              data stream. Its resolution is 1ms."
 END_OBJECT                = COLUMN

 OBJECT                    = COLUMN
   NAME                    = "COBT_END"
   DATA_TYPE               = CHARACTER
   START_BYTE              = 124
   BYTES                   = 8
   DESCRIPTION             = "GC measurement end time as COSAC on-board time
                              (hexadecimal).COBT replaces the LOBT in certain
                              places used in previous versions of the science
                              data stream. Its resolution is 1ms."
 END_OBJECT                = COLUMN

/*  COSAC_GC_SPECTRUM           */


 OBJECT                    = COLUMN
   NAME                    = "X_LOW"
   DATA_TYPE               = ASCII_REAL
   START_BYTE              = 134
   BYTES                   = 8
   UNIT                    = "SECOND"
   FORMAT                  = "F8.6"
   DESCRIPTION             = "Time relative to spectrum start time for
                                low resolution"
 END_OBJECT                = COLUMN

 OBJECT                    = COLUMN
   NAME                    = "Y_LOW"
   DATA_TYPE               = ASCII_INTEGER
   START_BYTE              = 143
   BYTES                   = 4
   UNIT                    = "N/A"
   DESCRIPTION             = "Y Low resolution"
 END_OBJECT                = COLUMN

 OBJECT                    = COLUMN
   NAME                    = "X_HIGH"
   DATA_TYPE               = ASCII_REAL
   START_BYTE              = 148
   BYTES                   = 8
   UNIT                    = "SECOND"
   FORMAT                  = "F8.6"
   DESCRIPTION             = "Time relative to spectrum start time for
                                high resolution"
 END_OBJECT                = COLUMN

 OBJECT                    = COLUMN
   NAME                    = "Y_HIGH"
   DATA_TYPE               = ASCII_INTEGER
   START_BYTE              = 157
   BYTES                   = 4
   UNIT                    = "N/A"
   DESCRIPTION             = "Y High resolution"
 END_OBJECT                = COLUMN
```

4.3.2.3.6 MS Data Object Definition

The following TABLE objects are included in a complete MS measurement for flight software version previous to 1.8:

```
COSAC_CONFIG_TABLE
COSAC_FULL_HK_TABLE
COSAC_ADC_MS_TABLE
COSAC_TIME_ID_TABLE
COSAC_MS_SPECTRUM_2_TABLE (for CODMAC 2)
COSAC_MS_SPECTRUM_3_TABLE (for CODMAC 3)
```

The following TABLE objects are included in a complete MS measurement for flight software version 1.8:

```
COSAC_CONFIG_TABLE
COSAC_FULL_HK_TABLE
COSAC_HK_BURST_TABLE
COSAC_MS_SPECTRUM_2_TABLE (for CODMAC 2)
COSAC_MS_SPECTRUM_3_TABLE (for CODMAC 3)
```

The description of the ADC_MS table (the table name contains the ADC readout number):

```
  OBJECT                    = COSAC_ADC_MS_TABLE
      NAME                  = ADC_MS
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 46
      ^STRUCTURE            = "COSAC_ADC_MS.FMT"
      COLUMNS               = 16
      ROW_BYTES             = 139
  END_OBJECT                = COSAC_ADC_MS_TABLE
```

The structure of the TABLE object is described in the file COSAC_ADC_MS.FMT as follows:

```
/*        Contents of format file  "COSAC_ADC_MS.FMT"                    */

 /* index of the cycle, and the tag inside the cycle */
 OBJECT       = COLUMN
  NAME        = "CYCLE_INDEX"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 1
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "Index of the cycle containing the ADC_MS_ID tag"
 END_OBJECT   = COLUMN

  OBJECT       = COLUMN
  NAME        = "INSIDE_CYCLE"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 7
  BYTES       = 5
  UNIT        = "N/A"
  DESCRIPTION = "Index of ADC_MS_ID tag in the same cycle"
 END_OBJECT   = COLUMN
/*      ..............  MS  (16 parameters)  ......................... */

 OBJECT       = COLUMN
  NAME        = "PIPEA_M_TEMP"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 13
  BYTES       = 8
  UNIT        = KELVIN
```

```
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Pipe a (main)"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "PIPEB_M_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 22
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Pipe b (side)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "OVEN_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 31
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature Oven"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MSEBOX_TEMP"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 40
 BYTES       = 8
 UNIT        = KELVIN
 FORMAT      = "F8.2"
 DESCRIPTION = "Temperature MS-EBox"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CALGAS_PRESSURE"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 49
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Pressure Calibration Gas"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_POSITION"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 58
 BYTES       = 8
 UNIT        = "N/A"
 FORMAT      = "I8"
 DESCRIPTION = "Position Tapping Station
                 Open >= 4500,
                 OT (Oberer Totpunkt/Top dead centre) ~ 4710,
                 UT (Unterer Totpunkt/bottom dead centre) ~ 1330)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "EMISSION_CURRENT"
 DATA_TYPE   = ASCII_REAL
```

```
 START_BYTE  = 67
 BYTES       = 8
 UNIT        = NANOAMPERE
 FORMAT      = "F8.2"
 DESCRIPTION = "Emission current"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV1_DET_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 76
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 1, U detector"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV2_REFL2_4_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 85
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 2, U reflector2_4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV3_REFL2_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 94
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 3, U reflector 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV4_REFL1_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 103
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 4, U reflector 1"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV5_LENSE2_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 112
 BYTES       = 8
 UNIT        = VOLT
 FORMAT      = "F8.2"
 DESCRIPTION = "MS HV 5, U lense 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV6_LENSE1_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 121
```

```
  BYTES       = 8
  UNIT        = VOLT
  FORMAT      = "F8.2"
  DESCRIPTION = "MS HV 6, U lense 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "MS_HV7_G3_V"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 130
  BYTES       = 8
  UNIT        = VOLT
  FORMAT      = "F8.2"
  DESCRIPTION = "MS HV 7, U G3"
 END_OBJECT   = COLUMN
```

The description of the MS spectrum table for flight software version previous to 1.8 (the table name contains the spectrum number):

For CODMAC level 2:

```
  OBJECT                      = COSAC_MS_SPECTRUM_2_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 16000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_2.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 66
  END_OBJECT                  = COSAC_MS_SPECTRUM_2_TABLE
```

For CODMAC level 3:

```
  OBJECT                      = COSAC_MS_SPECTRUM_3_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 16000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_3.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 66
  END_OBJECT                  = COSAC_MS_SPECTRUM_3_TABLE
```

The structure of the TABLE object is described in the file COSAC_MS_SPECTRUM_2.FMT as follows:

```
/*    Contents of format file  "COSAC_MS_SPECTRUM_2.FMT"    */

/* COSAC_MS_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_LOBT"
```

```
   DATA_TYPE             = CHARACTER
   START_BYTE            = 8
   BYTES                 = 14
   DESCRIPTION           = "Spectrum LOBT ; LOBT is represented as :
                            Reset number (integer starting at 1) / seconds.
                            Reset number 1 starts at 2003-01-01T00:00:00 UTC
                            The time resolution is 0.03125 s"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_UTC"
   DATA_TYPE             = TIME
   START_BYTE            = 24
   BYTES                 = 23
   DESCRIPTION           = "Spectrum UTC"
 END_OBJECT              = COLUMN

/* COSAC_MS_SPECTRUM          */

 OBJECT                  = COLUMN
   NAME                  = "CHANNEL_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 48
   BYTES                 = 8
   UNIT                  = "N/A"
   DESCRIPTION           = "Channel Number "
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "COUNT"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 57
   BYTES                 = 8
   UNIT                  = "N/A"
   DESCRIPTION           = "Number of counts"
 END_OBJECT              = COLUMN
```

The structure of the TABLE object is described in the file COSAC_MS_SPECTRUM_3.FMT as follows:

```
/*          Contents of format file  "COSAC_MS_SPECTRUM_3.FMT"          */

/* COSAC_MS_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_LOBT"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 8
   BYTES                 = 14
   DESCRIPTION           = "Spectrum LOBT ; LOBT is represented as :
                            Reset number (integer starting at 1) / seconds.
                            Reset number 1 starts at 2003-01-01T00:00:00 UTC
                            The time resolution is 0.03125 s"
```

```
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_UTC"
   DATA_TYPE             = TIME
   START_BYTE            = 24
   BYTES                 = 23
   DESCRIPTION           = "Spectrum UTC"
 END_OBJECT              = COLUMN

/* COSAC_MS_SPECTRUM          */

 OBJECT                  = COLUMN
   NAME                  = "MASS"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 48
   BYTES                 = 8
   FORMAT                = "F15.6"
   UNIT                  = "????"
   DESCRIPTION           = "Atomic Mass unit per charge (amu/q) "
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "COUNT"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 57
   BYTES                 = 8
   UNIT                  = "N/A"
   DESCRIPTION           = "Counts"
 END_OBJECT              = COLUMN
```

The description of the MS spectrum table for flight software version 1.8 (the table name contains the spectrum number):

For CODMAC level 2:

```
  OBJECT                      = COSAC_MS_SPECTRUM_2_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 16000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_2_FM1_8.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 60
  END_OBJECT                  = COSAC_MS_SPECTRUM_2_TABLE
```

For CODMAC level 3:

```
  OBJECT                      = COSAC_MS_SPECTRUM_3_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 16000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_3_FM1_8.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 60
  END_OBJECT                  = COSAC_MS_SPECTRUM_3_TABLE
```

The structure of the TABLE object is described in the file COSAC_MS_SPECTRUM_2_FM1_8.FMT as follows:

```
/*    Contents of format file  "COSAC_MS_SPECTRUM_2_FM1_8.FMT"    */
/* valid for flight software V 1.8 uploaded at PC 10,            */
/*  2009-09-23T22:00:00 UTC                                      */


/* COSAC_MS_SPECTRUM_HEADER */

 OBJECT              = COLUMN
  NAME               = "SPECTRUM_NUMBER"
  DATA_TYPE          = ASCII_INTEGER
  START_BYTE         = 1
  BYTES              = 5
  DESCRIPTION        = "Spectrum Number"
 END_OBJECT          = COLUMN

 OBJECT              = COLUMN
  NAME               = "SPECTRUM_UTC"
  DATA_TYPE          = TIME
  START_BYTE         = 7
  BYTES              = 23
  DESCRIPTION        = " UTC in PDS standard format
                     YYYY-MM-DDThh:mm:ss.sss"
 END_OBJECT          = COLUMN

 OBJECT              = COLUMN
  NAME               = "SPECTRUM_COBT"
  DATA_TYPE          = CHARACTER
  START_BYTE         = 32
  BYTES              = 8
  DESCRIPTION        = "Spectrum COSAC on Board Time (hexadecimal).
                     COBT replaces the LOBT in certain places used in
                     previous versions of the science data stream. Its
                     resolution is 1ms."
 END_OBJECT          = COLUMN


/* COSAC_MS_SPECTRUM         */

 OBJECT              = COLUMN
  NAME               = "CHANNEL_NUMBER"
  DATA_TYPE          = ASCII_INTEGER
  START_BYTE         = 42
  BYTES              = 8
  UNIT               = "N/A"
  DESCRIPTION        = "Channel Number "
 END_OBJECT          = COLUMN

 OBJECT              = COLUMN
  NAME               = "COUNT"
  DATA_TYPE          = ASCII_INTEGER
  START_BYTE         = 51
  BYTES              = 8
  UNIT               = "N/A"
  DESCRIPTION        = "Number of counts"
 END_OBJECT          = COLUMN
```

The structure of the TABLE object is described in the file COSAC_MS_SPECTRUM_3_FM1_8.FMT as follows:

```
/*  Contents of format file  "COSAC_MS_SPECTRUM_3_FM1_8.FMT"     */
/* valid for flight software V 1.8 uploaded at PC 10,             */
/*  2009-09-23T22:00:00 UTC                                       */


/* COSAC_MS_SPECTRUM_HEADER */

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_NUMBER"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 1
   BYTES                 = 5
   DESCRIPTION           = "Spectrum Number"
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "SPECTRUM_UTC"
   DATA_TYPE             = TIME
   START_BYTE            = 7
   BYTES                 = 23
   DESCRIPTION           = " UTC in PDS standard format
                           YYYY-MM-DDThh:mm:ss.sss"
 END_OBJECT              = COLUMN

  OBJECT                 = COLUMN
   NAME                  = "SPECTRUM_COBT"
   DATA_TYPE             = CHARACTER
   START_BYTE            = 32
   BYTES                 = 8
   DESCRIPTION           = "Spectrum COSAC on Board Time (hexadecimal).
                           COBT replaces the LOBT in certain places used in
                           previous versions of the science data stream. Its
                           resolution is 1ms."
 END_OBJECT              = COLUMN

/* COSAC_MS_SPECTRUM          */

 OBJECT                  = COLUMN
   NAME                  = "MASS"
   DATA_TYPE             = ASCII_REAL
   START_BYTE            = 42
   BYTES                 = 8
   FORMAT                = "F8.6"
   UNIT                  = "????"
   DESCRIPTION           = "Atomic Mass unit per charge (amu/q) "
 END_OBJECT              = COLUMN

 OBJECT                  = COLUMN
   NAME                  = "COUNT"
   DATA_TYPE             = ASCII_INTEGER
   START_BYTE            = 51
   BYTES                 = 8
   UNIT                  = "N/A"
   DESCRIPTION           = "Counts"
 END_OBJECT              = COLUMN
```

4.3.2.3.7 GC/MS Data Object Definition

The following TABLE objects are included in a complete GCMS measurement for flight software version previous to 1.8:

```
CONFIG_TABLE
FULL_HK_TABLE
ADC_GC_TABLE
ADC_MS_TABLE
TIME_ID_TABLE

MS_SPECTRUM_TABLE_2 (CODMAC level 2)
GC_SPECTRUM_TABLE_2 (CODMAC LEVEL 2)
MS_SPECTRUM_TABLE_3 (CODMAC level 3)
GC_SPECTRUM_TABLE_3 (CODMAC LEVEL 3)
```

The following TABLE objects are included in a complete GCMS measurement for flight software version 1.8:

```
CONFIG_TABLE
FULL_HK_TABLE
HK_BURST_TABLE

MS_SPECTRUM_2_TABLE (for CODMAC 2)
MS_SPECTRUM_3_TABLE (for CODMAC 3)
GC_SPECTRUM_2_TABLE (for CODMAC 2)
GC_SPECTRUM_3_TABLE (for CODMAC 3)
```

The GC and MS spectra are described in the previous paragraphs.

4.3.2.4 Description of Instrument

N/A

4.3.2.5 Parameters Index File Definition

N/A

4.3.2.6 Mission Specific Keywords

4.3.2.6.1 Instrument Specific Keywords

N/A

4.3.2.6.2 Sample Tracking Specific Keywords

These keywords has been defined to track the cometary material drilled and distributed by SD2 system. They are N/A during the cruise.

ROSETTA : SD2_OVEN_FILLING

- **Type:** character
- **Standard values:** "YES" or "NO"
- **Description:** filling conditions of the pictured oven as deduced from the SD2 data

ROSETTA : SD2_DRILL_DEPTH
- **Type**: real, unit mm
- **Standard values**: refer to SD2 data (or missing value)
- **Description:** depth of the drilling process as deduced from the SD2 data

ROSETTA : SD2_OVEN_NUMBER
- **Type:** integer
- **Standard values:** 1 to 26 or 99 (missing data)
- **Description:** number of the oven filled by the SD2 system

ROSETTA : SD2_OVEN_TYPE
- **Type:** character
- **Standard values**: "MTO" or "HTO"
- **Description:** type of the oven filled by the SD2 system (Medium Temperature Oven or High Temperature Oven)

ROSETTA : SAMPLE_TAPPING
- **Type:** character
- **Standard values:** "YES" or "NO" or "N/A"
- **Description:** tapping conditions of the pictured oven as deduced from the PTOLEMY or COSAC data

ROSETTA : SAMPLE_NUMBER
- **Type:** integer
- **Standard values**: 1, 2,…or missing value
- **Description:** number of number of sample (1 for the first sample of the mission and n+1 for the following ones)

ROSETTA : SAMPLE_VOLUME
- **Type:** real, mm3
- **Standard values**: from Volume Checker
- **Description:** amount of sample discharged into the oven from the Volume Checker data

4.3.3 Data Product Design of Calibrated HK Data (Level 3)

Level 3 HK contains calibrated COSAC housekeeping data with PDS detached labels.

4.3.3.1 File Characteristics Data Elements

The PDS file characteristic data elements for COSAC calibrated housekeepîng data (level 3) are:

```
RECORD_TYPE             = FIXED_LENGTH
RECORD_BYTES            = 366
FILE_RECORDS            = 40
PRODUCT_TYPE            = RDR
PROCESSING_LEVEL_ID     =  1
```

4.3.3.2 Data Object Pointers Identification Data Elements

The calibrated HK data are organized as an ASCII table with comma separated values (CSV). The PDS label refers to a single data object which is a TABLE. The data object pointers (^TABLE) reference CSV files.

4.3.3.3 Instrument and Detector Descriptive Data Elements

N/A

4.3.3.4 Structure Definition of Instrument Parameter Objects

N/A

4.3.3.5 Data Object Definition

The description of the calibrated HK table:

The structure of the TABLE object is described in the file COSAC_CALIBRATED_HK.FMT as follows:

```
/*          Contents of format file  "COSAC_CALIBRATED_HK.FMT"      */
/*      ...................  DPU  ..............................    */

 OBJECT       = COLUMN
  NAME        = "p5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 1
  BYTES       = 8
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT +5V LINE"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "m5V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 10
  BYTES       = 8
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT -5V LINE"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "p12V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 19
  BYTES       = 8
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT +12V LINE"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "m12V_C"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 28
  BYTES       = 8
  UNIT        = MILLIAMPERE
  DESCRIPTION = "CURRENT -12V LINE"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "System_power"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 37
  BYTES       = 8
  UNIT        = WATT
  DESCRIPTION = "SYSTEM POWER "
 END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "GC_ADC_Input"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 46
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "GC ADC INPUT"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_ADC_Input"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 55
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "MS ADC INPUT"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Chan7_DPU_Mux"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 64
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 7"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Chan8_DPU_Mux"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 73
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 8"
END_OBJECT   = COLUMN


OBJECT       = COLUMN
 NAME        = "Chan9_DPU_Mux"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 82
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 9"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Chan10_DPU_Mux"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 91
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "DPU MUX CHANNEL 10"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Chan11_DPU_Mux"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 100
 BYTES       = 8
 UNIT        = "N/A"
```

```
  DESCRIPTION = "DPU MUX CHANNEL 11"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Chan12_DPU_Mux"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 109
  BYTES       = 8
  UNIT        = "N/A"
  DESCRIPTION = "DPU MUX CHANNEL 12 "
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Chan13_DPU_Mux"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 118
  BYTES       = 8
  UNIT        = "N/A"
  DESCRIPTION = "DPU MUX CHANNEL 13"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Chan14_DPU_Mux"
  DATA_TYPE   = ASCII_INTEGER
  START_BYTE  = 127
  BYTES       = 8
  UNIT        = "N/A"
  DESCRIPTION = "DPU MUX CHANNEL 14"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "DPU_Voltage"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 136
  BYTES       = 8
  UNIT        = VOLT
  DESCRIPTION = "VOLTAGE DPU"
 END_OBJECT   = COLUMN

/*      ..................  GC  ..............................    */

 OBJECT       = COLUMN
  NAME        = "He1_Pressure"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 145
  BYTES       = 10
  UNIT        = PASCAL
  DESCRIPTION = "Pressure He Tank 1"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "He2_Pressure"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 156
  BYTES       = 10
  UNIT        = PASCAL
  DESCRIPTION = "Pressure He Tank 2"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "IonS_MS_Pressure"
```

```
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 167
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "Pressure Ion Source MS (Hexadecimal format)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GCBoard2_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 176
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature GC-Board2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Tenax_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 185
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Tenax"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "He_Sec_Pressure"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 194
 BYTES       = 8
 UNIT        = PASCAL
 DESCRIPTION = "Secondary pressure HE)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Valve_Voltage"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 203
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "Voltage valve unit"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Column1_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 212
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Column 1)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Column2_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 221
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Column 2"
END_OBJECT   = COLUMN
```

```
 OBJECT       = COLUMN
  NAME        = "Column3_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 230
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 3"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Column4_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 239
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 4"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Column5_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 248
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 5"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Column6_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 257
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 6"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Column7_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 266
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 7"
 END_OBJECT   = COLUMN

 OBJECT       = COLUMN
  NAME        = "Column8_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 275
  BYTES       = 8
  UNIT        = KELVIN
  DESCRIPTION = "Temperature Column 8)"
 END_OBJECT   = COLUMN

/*      ..................  MS  ..............................    */

 OBJECT       = COLUMN
  NAME        = "PipeA_m_Temp"
  DATA_TYPE   = ASCII_REAL
  START_BYTE  = 284
  BYTES       = 8
```

```
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Pipe a (main)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "PipeB_m_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 293
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Pipe b (side)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Oven_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 302
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature Oven"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MSEBox_Temp"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 311
 BYTES       = 8
 UNIT        = KELVIN
 DESCRIPTION = "Temperature MS-EBox)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "CalGas_Pressure"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 320
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "Pressure Calibration Gas"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "TPST_Position"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 329
 BYTES       = 8
 UNIT        = "N/A"
 DESCRIPTION = "Position Tapping Station
               Open >= 4500,
               OT (Oberer Totpunkt/Top dead centre) ~ 4710,
               UT (Unterer Totpunkt/bottom dead centre) ~ 1330)"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "Emission_Current"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 338
 BYTES       = 8
 UNIT        = NANOAMPERE
 DESCRIPTION = "Emission current"
END_OBJECT   = COLUMN
```

```
OBJECT       = COLUMN
 NAME        = "MS_HV1_det_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 347
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 1, U detector"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV2_refl2_4_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 356
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 2, U reflector2_4"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV3_refl2_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 365
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 3, U reflector 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV4_refl1_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 374
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 4, U reflector 1"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV5_lense2_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 383
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 5, U lense 2"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV6_lense1_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 392
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 6, U lense 1"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_HV7_G3_V"
 DATA_TYPE   = ASCII_REAL
 START_BYTE  = 401
 BYTES       = 8
 UNIT        = VOLT
 DESCRIPTION = "MS HV 7, U G3"
```

```
 END_OBJECT    = COLUMN

/*      ...................  OS  ..............................    */

 OBJECT        = COLUMN
  NAME         = "Rec_CDMS_Msg"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 410
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Counter for received CDMS messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "Trans_CDMS_Msg"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 417
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Counter for transmit CDMS messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "Stat_CDMS_Msg"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 424
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Counter for CDMS status messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "Stored_Msg"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 431
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Counter for stored messages (TCs)"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "RERC_Msg"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 438
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Counter for RERC messages"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "Last_SSIF_error"
  DATA_TYPE    = ASCII_INTEGER
  START_BYTE   = 445
  BYTES        = 6
  UNIT         = "N/A"
  DESCRIPTION  = "Last received Subsystem  Interface error code)"
 END_OBJECT    = COLUMN

 OBJECT        = COLUMN
  NAME         = "LOBT_high"
  DATA_TYPE    = ASCII_INTEGER
```

```
 START_BYTE  = 452
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "LOBT, high"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "LOBT_low"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 459
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "LOBT, low"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "BRAM_pointer"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 466
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "BackupRAM pointer"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "PHeCopy"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 473
 BYTES       = 6
 UNIT        = " PASCAL "
 DESCRIPTION = "copy of Pressure HE"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "MS_Cycles"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 480
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "MS cycles"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "GC_Cycles"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 487
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "GC cycles"
END_OBJECT   = COLUMN

OBJECT       = COLUMN
 NAME        = "SysStatus2"
 DATA_TYPE   = ASCII_INTEGER
 START_BYTE  = 494
 BYTES       = 6
 UNIT        = "N/A"
 DESCRIPTION = "System Status 2
      Single Shot Valve: b01 = armed, b11 = fired
      HK auto collection: 0 = disabled, 1 = enabled
      MM dump: 0 = idle, 1 = in progress
```

```
      MM auto dump: 0 = disabled, 1 = enabled"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "SysStatus1"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 501
 BYTES        = 6
 UNIT         = "N/A"
 DESCRIPTION = "System Status 1
   Configuration valid: bxx1 = TPST, bx1x = MS,  b1xx = GC
   Continue Flag (not supported)
   Waiting flag (not supported)
   System Mode: b000 = idle, b001 = GC, b010=MS, b011=GCMS, b100 = Self test
   Power Switch: bxxx1=pws1, bxx1x=pws2, bx1xx=pws3 (not used), b1xxx = pws4
   Mass Memory: 0 = off, 1 = on
   EEPROM Timestamp: 0 = okay, 1 = mismatch
   TPST direction changed: 0 = false, 1 = true
   SD2 ready flag: 0 = false, 1 = true"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "Error_Msg"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 508
 BYTES        = 6
 UNIT         = "N/A"
 DESCRIPTION = "Error Message"
END_OBJECT    = COLUMN

OBJECT        = COLUMN
 NAME         = "TPST_last"
 DATA_TYPE    = ASCII_INTEGER
 START_BYTE   = 515
 BYTES        = 6
 UNIT         = "N/A"
 DESCRIPTION = "Last read position of TPST"
END_OBJECT    = COLUMN
```

4.3.3.6 Description of Instrument

N/A

4.3.3.7 Parameters Index File Definition

N/A

4.3.3.8 Mission Specific Keywords

N/A

5 Appendix A : Available Software to read PDS files

The level 3 housekeeping and science PDS files can be read with the PDS table verifier tool "tbtool" and readpds (Small Bodies Node tool).

6 Appendix B : Example of PDS combined detached label for COSAC GC level 2 data product (version previous to 1.8)

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE  = "2007-07-16, SONC, version 1.0"
/* PVV version 3.0 */

/*              GC measurements (Level 2)              */

DATA_SET_ID         = "RL-E-COSAC-2-EAR2-V1.0"
DATA_SET_NAME       = "ROSETTA-LANDER EARTH COSAC 2 EAR2 V1.0"
PRODUCT_ID          = "COS_FGCS2_070925010423_0000"
PRODUCT_CREATION_TIME = 2009-02-26T11:36:37
MISSION_NAME         = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME   = "EARTH SWING-BY 2"
MISSION_ID           = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID   = RL
PRODUCT_TYPE         = EDR
START_TIME           = 2007-09-25T01:04:23.810
STOP_TIME            = 2007-09-25T01:04:23.810
SPACECRAFT_CLOCK_START_COUNT = "2/149303031.21"
SPACECRAFT_CLOCK_STOP_COUNT  = "2/149303031.21"

PRODUCER_ID          = "SONC"
PRODUCER_FULL_NAME   = "SCIENCE OPERATIONS AND NAVIGATION CENTER"
PRODUCER_INSTITUTION_NAME = "CNES"

INSTRUMENT_ID        = COSAC
INSTRUMENT_NAME      = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE      = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID   = "N/A"
INSTRUMENT_MODE_DESC = "N/A"

TARGET_NAME          = "EARTH"
TARGET_TYPE          = "PLANET"

PROCESSING_LEVEL_ID  = 2

DATA_QUALITY_ID      = -1
DATA_QUALITY_DESC    = "-1 : NOT QUALIFIED"

/* GEOMETRY PARAMETERS */

/* SPACECRAFT LOCATION: Position <km> */
SC_SUN_POSITION_VECTOR = ( -185273030.9, -34417331.1, -10516343.2)
/* TARGET PARAMETERS: Position <km>, Velocity <km/s> */
SC_TARGET_POSITION_VECTOR = (  -35270974.5, -30840383.3,  -8966204.1)
SC_TARGET_VELOCITY_VECTOR = (         11.7,         7.2,         2.3)
/* SPACECRAFT POSITION WITH RESPECT TO CENTRAL BODY */
SPACECRAFT_ALTITUDE =    47696491.5 <km>
SUB_SPACECRAFT_LATITUDE =    10.80 <deg>
SUB_SPACECRAFT_LONGITUDE =    22.42 <deg>
NOTE = "The values of the keywords SC_SUN_POSITION_VECTOR,
       SC_TARGET_POSITION_VECTOR and SC_TARGET_VELOCITY_VECTOR
       are related to the EMEJ2000 reference frame.
       The values of SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
       are northern latitude and eastern longitude in the standard
       planetocentric IAU_<TARGET_NAME> frame.
       All values are computed for the time = START_TIME.
```

```
       Distances are given in <km> velocities in <km/s>, Angles in <deg>"

/* SD2 PARAMETERS */

ROSETTA:SD2_OVEN_FILLING = "N/A"
ROSETTA:SD2_DRILL_DEPTH  = 999.99
ROSETTA:SD2_OVEN_NUMBER  = 99
ROSETTA:SD2_OVEN_TYPE    = "N/A"
ROSETTA:SAMPLE_NUMBER    = 99
ROSETTA:SAMPLE_TAPPING   = "N/A"
ROSETTA:SAMPLE_VOLUME    = 999.99

/* DATA OBJECT DEFINITION  */

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 659
  ^COSAC_CONFIG_TABLE        = ("COS_FGCS2_070925010423_CONF.TAB")
  OBJECT                     = COSAC_CONFIG_TABLE
      NAME                   = CONFIG
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_CONFIG.FMT"
      COLUMNS                = 82
      ROW_BYTES              = 659
  END_OBJECT                 = COSAC_CONFIG_TABLE

END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 790
  ^COSAC_FULL_HK_TABLE       = ("COS_FGCS2_070925010423_HKID.TAB")
  OBJECT                     = COSAC_FULL_HK_TABLE
      NAME                   = FULL_HK_ID
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1

      ^STRUCTURE             = "COSAC_FULL_HK_SC.FMT"
      COLUMNS                = 92
      ROW_BYTES              = 790
  END_OBJECT                 = COSAC_FULL_HK_TABLE
END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 45
  RECORD_BYTES               = 152
  ^COSAC_ADC_GC_TABLE        = ("COS_FGCS2_070925010423_ADGC.TAB")
  OBJECT                     = COSAC_ADC_GC_TABLE
      NAME                   = ADC_MS
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 45
      ^STRUCTURE             = "COSAC_ADC_GC.FMT"
      COLUMNS                = 17
      ROW_BYTES              = 152
  END_OBJECT                 = COSAC_ADC_GC_TABLE
END_OBJECT                   = FILE
```

```
OBJECT                          = FILE
  RECORD_TYPE                   = FIXED_LENGTH
  FILE_RECORDS                 = 2048
  RECORD_BYTES                 = 98
  ^COSAC_GC_SPECTRUM_2_TABLE   = ("COS_FGCS2_070925010423_GCID.TAB")
  OBJECT                        = COSAC_GC_SPECTRUM_2_TABLE
      NAME                      = MS_ID
      INTERCHANGE_FORMAT        = ASCII
      ROWS                      = 2048
      ^STRUCTURE                = "COSAC_GC_SPECTRUM_2.FMT"
      COLUMNS                   = 8
      ROW_BYTES                 = 98
  END_OBJECT                    = COSAC_GC_SPECTRUM_2_TABLE
END_OBJECT                      = FILE

END
```

7 Appendix C : Example of PDS combined detached label for COSAC GC level 2 data product (version 1.8)

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE  = "2007-07-16, SONC, version 1.0"
/* PVV version 3.6 */

/*              GC measurements (Level 2)              */

DATA_SET_ID         = "RL-E-COSAC-2-EAR3-V1.0"
DATA_SET_NAME       = "ROSETTA-LANDER EARTH COSAC 2 EAR3 V1.0"
PRODUCT_ID          = "COS_FGCS2_090924215345_0000"
PRODUCT_CREATION_TIME = 2010-06-24T08:42:58
MISSION_NAME         = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME   = "EARTH SWING-BY 3"
MISSION_ID           = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID   = RL
OBSERVATION_TYPE    = "ACTIVE CHECKOUT 10"

PRODUCT_TYPE         = EDR
START_TIME           = 2009-09-24T21:53:45.875
STOP_TIME            = 2009-09-24T21:53:45.875
SPACECRAFT_CLOCK_START_COUNT = "2/212484111.27"
SPACECRAFT_CLOCK_STOP_COUNT  = "2/212484111.27"

PRODUCER_ID          = "SONC"
PRODUCER_FULL_NAME   = "SCIENCE OPERATIONS AND NAVIGATION CENTER"
PRODUCER_INSTITUTION_NAME = "CNES"

INSTRUMENT_ID        = COSAC
INSTRUMENT_NAME      = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE      = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID   = "N/A"
INSTRUMENT_MODE_DESC = "N/A"
TARGET_NAME          = "EARTH"
TARGET_TYPE          = "PLANET"

PROCESSING_LEVEL_ID  = 2
DATA_QUALITY_ID      = -1
```

```
DATA_QUALITY_DESC    = "-1 : NOT QUALIFIED"

/* GEOMETRY PARAMETERS */

/* SPACECRAFT LOCATION: Position <km> */
SC_SUN_POSITION_VECTOR = ( -188684364.5, -27008602.8,   7896408.2)
/* TARGET PARAMETERS: Position <km>, Velocity <km/s> */
SC_TARGET_POSITION_VECTOR = (  -38720764.9, -22584033.1,   9812970.1)
SC_TARGET_VELOCITY_VECTOR = (         12.3,         5.6,        -1.5)
/* SPACECRAFT POSITION WITH RESPECT TO CENTRAL BODY */
SPACECRAFT_ALTITUDE =    45880773.1 <km>
SUB_SPACECRAFT_LATITUDE =   -12.22 <deg>
SUB_SPACECRAFT_LONGITUDE =    58.77 <deg>
NOTE = "The values of the keywords SC_SUN_POSITION_VECTOR,
       SC_TARGET_POSITION_VECTOR and SC_TARGET_VELOCITY_VECTOR
       are related to the EMEJ2000 reference frame.
       The values of SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
       are northern latitude and eastern longitude in the standard
       planetocentric IAU_<TARGET_NAME> frame.
       All values are computed for the time = START_TIME.
       Distances are given in <km> velocities in <km/s>, Angles in <deg>"

/* SD2 PARAMETERS */
ROSETTA:SD2_OVEN_FILLING = "N/A"
ROSETTA:SD2_DRILL_DEPTH  = 999.99
ROSETTA:SD2_OVEN_NUMBER  = 99
ROSETTA:SD2_OVEN_TYPE    = "N/A"
ROSETTA:SAMPLE_NUMBER    = 99
ROSETTA:SAMPLE_TAPPING   = "N/A"
ROSETTA:SAMPLE_VOLUME    = 999.99
ROSETTA:INSTRUMENT_ENDUSER  = "N/A"

/* DATA OBJECT DEFINITION  */

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 688
  ^COSAC_CONFIG_TABLE        = ("COS_FGCS2_090924215345_CONF.TAB")
  OBJECT                     = COSAC_CONFIG_TABLE
      NAME                   = CONFIG
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_CONFIG_FM1_8.FMT"
      COLUMNS                = 84
      ROW_BYTES              = 688
  END_OBJECT                 = COSAC_CONFIG_TABLE
END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 790
  ^COSAC_FULL_HK_TABLE       = ("COS_FGCS2_090924215345_HKID.TAB")
  OBJECT                     = COSAC_FULL_HK_TABLE
      NAME                   = FULL_HK_ID
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_FULL_HK_SC.FMT"
      COLUMNS                = 92
      ROW_BYTES              = 790
```

```
  END_OBJECT                = COSAC_FULL_HK_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 1
  RECORD_BYTES              = 1058
  ^COSAC_HK_BURST_TABLE     = ("COS_FGCS2_090924215345_HBID.TAB")
  OBJECT                    = COSAC_HK_BURST_TABLE
      NAME                  = HK_BURST_ID
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 1
      ^STRUCTURE            = "COSAC_HK_BURST.FMT"
      COLUMNS               = 123
      ROW_BYTES             = 1058
  END_OBJECT                = COSAC_HK_BURST_TABLE
END_OBJECT                  = FILE

OBJECT                        = FILE
  RECORD_TYPE                 = FIXED_LENGTH
  FILE_RECORDS              = 4096
  RECORD_BYTES              = 162
  ^COSAC_GC_SPECTRUM_2_TABLE  = ("COS_FGCS2_090924215345_GCID.TAB")
  OBJECT                      = COSAC_GC_SPECTRUM_2_TABLE
      NAME                    = GC_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 4096
      ^STRUCTURE              = "COSAC_GC_SPECTRUM_2_FM1_8.FMT"
      COLUMNS                 = 12
      ROW_BYTES               = 162
  END_OBJECT                  = COSAC_GC_SPECTRUM_2_TABLE
END_OBJECT                    = FILE


END
```

8 Appendix D : Example of PDS combined detached label for COSAC MS level 2 data product (version previous to 1.8)

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE  = "2007-07-16, SONC, version 1.0"
/* PVV version 3.0 */

/*              MS measurements (Level 2)              */

DATA_SET_ID         = "RL-E-COSAC-2-EAR2-V1.0"
DATA_SET_NAME       = "ROSETTA-LANDER EARTH COSAC 2 EAR2 V1.0"
PRODUCT_ID          = "COS_FMSS2_070924190112_0000"
PRODUCT_CREATION_TIME = 2009-02-26T11:36:39
MISSION_NAME          = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME    = "EARTH SWING-BY 2"
MISSION_ID            = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID    = RL
PRODUCT_TYPE          = EDR
START_TIME            = 2007-09-24T19:01:12.650
STOP_TIME             = 2007-09-24T19:01:12.650
SPACECRAFT_CLOCK_START_COUNT = "2/149281240.16"
SPACECRAFT_CLOCK_STOP_COUNT  = "2/149281240.16"

PRODUCER_ID           = "SONC"
```

```
PRODUCER_FULL_NAME   = "SCIENCE OPERATIONS AND NAVIGATION CENTER"
PRODUCER_INSTITUTION_NAME = "CNES"

INSTRUMENT_ID        = COSAC
INSTRUMENT_NAME      = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE      = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID   = "N/A"
INSTRUMENT_MODE_DESC = "N/A"

TARGET_NAME          = "EARTH"
TARGET_TYPE          = "PLANET"

PROCESSING_LEVEL_ID  = 2

DATA_QUALITY_ID      = -1
DATA_QUALITY_DESC    = "-1 : NOT QUALIFIED"

/* GEOMETRY PARAMETERS */

/* SPACECRAFT LOCATION: Position <km> */
SC_SUN_POSITION_VECTOR = ( -185554172.6, -33981836.6, -10308699.4)
/* TARGET PARAMETERS: Position <km>, Velocity <km/s> */
SC_TARGET_POSITION_VECTOR = (  -35525962.5, -30997839.4,  -9015592.5)
SC_TARGET_VELOCITY_VECTOR = (         11.7,         7.2,         2.3)
/* SPACECRAFT POSITION WITH RESPECT TO CENTRAL BODY */
SPACECRAFT_ALTITUDE =    47996132.6 <km>
SUB_SPACECRAFT_LATITUDE =    10.79 <deg>
SUB_SPACECRAFT_LONGITUDE =   113.40 <deg>
NOTE = "The values of the keywords SC_SUN_POSITION_VECTOR,
       SC_TARGET_POSITION_VECTOR and SC_TARGET_VELOCITY_VECTOR
       are related to the EMEJ2000 reference frame.
       The values of SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
       are northern latitude and eastern longitude in the standard
       planetocentric IAU_<TARGET_NAME> frame.
       All values are computed for the time = START_TIME.
       Distances are given in <km> velocities in <km/s>, Angles in <deg>"

/* SD2 PARAMETERS */

ROSETTA:SD2_OVEN_FILLING = "N/A"
ROSETTA:SD2_DRILL_DEPTH  = 999.99
ROSETTA:SD2_OVEN_NUMBER  = 99
ROSETTA:SD2_OVEN_TYPE    = "N/A"
ROSETTA:SAMPLE_NUMBER    = 99
ROSETTA:SAMPLE_TAPPING   = "N/A"
ROSETTA:SAMPLE_VOLUME    = 999.99

/* DATA OBJECT DEFINITION  */

OBJECT                    = FILE
  RECORD_TYPE             = FIXED_LENGTH
  FILE_RECORDS            = 1
  RECORD_BYTES            = 659
  ^COSAC_CONFIG_TABLE     = ("COS_FMSS2_070924190112_CONF.TAB")
  OBJECT                  = COSAC_CONFIG_TABLE
      NAME                = CONFIG
      INTERCHANGE_FORMAT  = ASCII
      ROWS                = 1
      ^STRUCTURE          = "COSAC_CONFIG.FMT"
      COLUMNS             = 82
      ROW_BYTES           = 659
```

```
  END_OBJECT                = COSAC_CONFIG_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 1
  RECORD_BYTES              = 790
  ^COSAC_FULL_HK_TABLE      = ("COS_FMSS2_070924190112_HKID.TAB")
  OBJECT                    = COSAC_FULL_HK_TABLE
      NAME                  = FULL_HK_ID
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 1
      ^STRUCTURE            = "COSAC_FULL_HK_SC.FMT"
      COLUMNS               = 92
      ROW_BYTES             = 790
  END_OBJECT                = COSAC_FULL_HK_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 46
  RECORD_BYTES              = 139
  ^COSAC_ADC_MS_TABLE       = ("COS_FMSS2_070924190112_ADCM.TAB")
  OBJECT                    = COSAC_ADC_MS_TABLE
      NAME                  = ADC_MS
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 46
      ^STRUCTURE            = "COSAC_ADC_MS.FMT"
      COLUMNS               = 16
      ROW_BYTES             = 139
  END_OBJECT                = COSAC_ADC_MS_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 1
  RECORD_BYTES              = 15
  ^COSAC_TIME_ID_TABLE      = ("COS_FMSS2_070924190112_TIME.TAB")
  OBJECT                    = COSAC_TIME_ID_TABLE
      NAME                  = TIME_ID
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 1
      ^STRUCTURE            = "COSAC_TIME_ID.FMT"
      COLUMNS               = 2
      ROW_BYTES             = 15
  END_OBJECT                = COSAC_TIME_ID_TABLE
END_OBJECT                  = FILE

OBJECT                        = FILE
  RECORD_TYPE                 = FIXED_LENGTH
  FILE_RECORDS                = 16000
  RECORD_BYTES                = 66
  ^COSAC_MS_SPECTRUM_2_TABLE  = ("COS_FMSS2_070924190112_MSID.TAB")
  OBJECT                      = COSAC_MS_SPECTRUM_2_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 16000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_2.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 66
  END_OBJECT                  = COSAC_MS_SPECTRUM_2_TABLE
```

```
END_OBJECT                    = FILE

END
```

9 Appendix E : Example of PDS combined detached label for COSAC MS level 2 data product (version 1.8)

```
PDS_VERSION_ID               = PDS3
LABEL_REVISION_NOTE  = "2007-07-16, SONC, version 1.0"
/* PVV version 3.6 */

/*              MS measurements (Level 2)               */

DATA_SET_ID         = "RL-E-COSAC-2-EAR3-V1.0"
DATA_SET_NAME       = "ROSETTA-LANDER EARTH COSAC 2 EAR3 V1.0"
PRODUCT_ID          = "COS_FMSS2_090924213816_0000"
PRODUCT_CREATION_TIME = 2010-06-24T08:43:02
MISSION_NAME         = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME   = "EARTH SWING-BY 3"
MISSION_ID           = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID   = RL
OBSERVATION_TYPE    = "ACTIVE CHECKOUT 10"

PRODUCT_TYPE         = EDR
START_TIME           = 2009-09-24T21:38:16.750
STOP_TIME            = 2009-09-24T21:38:16.750
SPACECRAFT_CLOCK_START_COUNT = "2/212455093.23"
SPACECRAFT_CLOCK_STOP_COUNT  = "2/212455093.23"

PRODUCER_ID          = "SONC"
PRODUCER_FULL_NAME   = "SCIENCE OPERATIONS AND NAVIGATION CENTER"
PRODUCER_INSTITUTION_NAME = "CNES"

INSTRUMENT_ID        = COSAC
INSTRUMENT_NAME      = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE      = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID   = "N/A"
INSTRUMENT_MODE_DESC = "N/A"
TARGET_NAME          = "EARTH"
TARGET_TYPE          = "PLANET"

PROCESSING_LEVEL_ID  = 2
DATA_QUALITY_ID      = -1
DATA_QUALITY_DESC    = "-1 : NOT QUALIFIED"

/* GEOMETRY PARAMETERS */

/* SPACECRAFT LOCATION: Position <km> */
SC_SUN_POSITION_VECTOR = ( -188697170.0, -26988543.3,   7908737.1)
/* TARGET PARAMETERS: Position <km>, Velocity <km/s> */
SC_TARGET_POSITION_VECTOR = (  -38732224.1, -22589262.9,   9814336.7)
SC_TARGET_VELOCITY_VECTOR = (         12.3,         5.6,        -1.5)
/* SPACECRAFT POSITION WITH RESPECT TO CENTRAL BODY */
SPACECRAFT_ALTITUDE =    45893308.9 <km>
SUB_SPACECRAFT_LATITUDE =   -12.22 <deg>
SUB_SPACECRAFT_LONGITUDE =    62.65 <deg>
NOTE = "The values of the keywords SC_SUN_POSITION_VECTOR,
```

```
       SC_TARGET_POSITION_VECTOR and SC_TARGET_VELOCITY_VECTOR
       are related to the EMEJ2000 reference frame.
       The values of SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
       are northern latitude and eastern longitude in the standard
       planetocentric IAU_<TARGET_NAME> frame.
       All values are computed for the time = START_TIME.
       Distances are given in <km> velocities in <km/s>, Angles in <deg>"

/* SD2 PARAMETERS */
ROSETTA:SD2_OVEN_FILLING = "N/A"
ROSETTA:SD2_DRILL_DEPTH  = 999.99
ROSETTA:SD2_OVEN_NUMBER  = 99
ROSETTA:SD2_OVEN_TYPE    = "N/A"
ROSETTA:SAMPLE_NUMBER    = 99
ROSETTA:SAMPLE_TAPPING   = "N/A"
ROSETTA:SAMPLE_VOLUME    = 999.99
ROSETTA:INSTRUMENT_ENDUSER  = "N/A"

/* DATA OBJECT DEFINITION  */

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 688
  ^COSAC_CONFIG_TABLE        = ("COS_FMSS2_090924213816_CONF.TAB")
  OBJECT                     = COSAC_CONFIG_TABLE
      NAME                   = CONFIG
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_CONFIG_FM1_8.FMT"
      COLUMNS                = 84
      ROW_BYTES              = 688
  END_OBJECT                 = COSAC_CONFIG_TABLE
END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 790
  ^COSAC_FULL_HK_TABLE       = ("COS_FMSS2_090924213816_HKID.TAB")
  OBJECT                     = COSAC_FULL_HK_TABLE
      NAME                   = FULL_HK_ID
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_FULL_HK_SC.FMT"
      COLUMNS                = 92
      ROW_BYTES              = 790
  END_OBJECT                 = COSAC_FULL_HK_TABLE
END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 1058
  ^COSAC_HK_BURST_TABLE      = ("COS_FMSS2_090924213816_HBID.TAB")
  OBJECT                     = COSAC_HK_BURST_TABLE
      NAME                   = HK_BURST_ID
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_HK_BURST.FMT"
      COLUMNS                = 123
```

```
      ROW_BYTES              = 1058
  END_OBJECT                 = COSAC_HK_BURST_TABLE
END_OBJECT                   = FILE

OBJECT                         = FILE
  RECORD_TYPE                  = FIXED_LENGTH
  FILE_RECORDS                 = 16000
  RECORD_BYTES                 = 60
  ^COSAC_MS_SPECTRUM_2_TABLE   = ("COS_FMSS2_090924213816_MSID.TAB")
  OBJECT                       = COSAC_MS_SPECTRUM_2_TABLE
      NAME                     = MS_ID
      INTERCHANGE_FORMAT       = ASCII
      ROWS                     = 16000
      ^STRUCTURE               = "COSAC_MS_SPECTRUM_2_FM1_8.FMT"
      COLUMNS                  = 5
      ROW_BYTES                = 60
  END_OBJECT                   = COSAC_MS_SPECTRUM_2_TABLE
END_OBJECT                     = FILE

END
```

10 Appendix F : Example of PDS combined detached label for COSAC GC/MS level 2 data product (version previous to 1.8)

```
PDS_VERSION_ID                = PDS3
LABEL_REVISION_NOTE  = "2009-03-10, SONC, version 1.0"
/* PVV version 3.0 */

/*        Combined GC and MS measurements (Level 2)     */

DATA_SET_ID          = "RL-CAL-COSAC-2-CVP-V1.0"
DATA_SET_NAME        = "ROSETTA-LANDER CAL COSAC 2 CVP V1.0"
PRODUCT_ID           = "COS_FGMS2_041006193328_0004"
PRODUCT_CREATION_TIME = 2009-03-05T11:00:02
MISSION_NAME          = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME   = "COMMISSIONING"
MISSION_ID           = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA-LANDER"
INSTRUMENT_HOST_ID   = RL
PRODUCT_TYPE         = EDR
START_TIME           = 2004-10-06T19:33:28.163
STOP_TIME            = 2004-10-06T19:33:32.163
SPACECRAFT_CLOCK_START_COUNT = " 1/55711983.28"
SPACECRAFT_CLOCK_STOP_COUNT  = " 1/55712245.26"

PRODUCER_ID          = "SONC"
PRODUCER_FULL_NAME   = "SCIENCE OPERATIONS AND NAVIGATION CENTER"
PRODUCER_INSTITUTION_NAME = "CNES"

INSTRUMENT_ID        = COSAC
INSTRUMENT_NAME      = "COMETARY SAMPLING AND COMPOSITION EXPERIMENT"
INSTRUMENT_TYPE      = {"GAS CHROMATOGRAPH","MASS SPECTROMETER"}
INSTRUMENT_MODE_ID   = "N/A"
INSTRUMENT_MODE_DESC = "N/A"

TARGET_NAME          = "CALIBRATION"
TARGET_TYPE          = "CALIBRATION"

PROCESSING_LEVEL_ID  = 2
DATA_QUALITY_ID      = -1
```

```
DATA_QUALITY_DESC    = "-1 : NOT QUALIFIED"

/* GEOMETRY PARAMETERS */

/* SPACECRAFT LOCATION: Position <km> */
SC_SUN_POSITION_VECTOR = ( -125932909.0, -94072726.7, -39737423.9)
/* TARGET PARAMETERS: Position <km>, Velocity <km/s> */
SC_TARGET_POSITION_VECTOR = ("N/A","N/A","N/A")
SC_TARGET_VELOCITY_VECTOR = ("N/A","N/A","N/A")
/* SPACECRAFT POSITION WITH RESPECT TO CENTRAL BODY */
SPACECRAFT_ALTITUDE =    69155898.6 <km>
SUB_SPACECRAFT_LATITUDE =    21.53 <deg>
SUB_SPACECRAFT_LONGITUDE =   159.36 <deg>
NOTE = "The values of the keywords SC_SUN_POSITION_VECTOR,
       SC_TARGET_POSITION_VECTOR and SC_TARGET_VELOCITY_VECTOR
       are related to the EMEJ2000 reference frame.
       The values of SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
       are northern latitude and eastern longitude in the standard
       planetocentric IAU_<TARGET_NAME> frame.
       All values are computed for the time = START_TIME.
       Distances are given in <km> velocities in <km/s>, Angles in <deg>"

/* SD2 PARAMETERS */

ROSETTA:SD2_OVEN_FILLING = "N/A"
ROSETTA:SD2_DRILL_DEPTH  = 999.99
ROSETTA:SD2_OVEN_NUMBER  = 99
ROSETTA:SD2_OVEN_TYPE    = "N/A"
ROSETTA:SAMPLE_NUMBER    = 99
ROSETTA:SAMPLE_TAPPING   = "N/A"
ROSETTA:SAMPLE_VOLUME    = 999.99

/* DATA OBJECT DEFINITION  */

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 659
  ^COSAC_CONFIG_TABLE        = ("COS_FGMS2_041006193328_CONF.TAB")
  OBJECT                     = COSAC_CONFIG_TABLE
      NAME                   = CONFIG
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_CONFIG.FMT"
      COLUMNS                = 82
      ROW_BYTES              = 659
  END_OBJECT                 = COSAC_CONFIG_TABLE
END_OBJECT                   = FILE

OBJECT                       = FILE
  RECORD_TYPE                = FIXED_LENGTH
  FILE_RECORDS               = 1
  RECORD_BYTES               = 790
  ^COSAC_FULL_HK_TABLE       = ("COS_FGMS2_041006193328_HKID.TAB")
  OBJECT                     = COSAC_FULL_HK_TABLE
      NAME                   = FULL_HK_ID
      INTERCHANGE_FORMAT     = ASCII
      ROWS                   = 1
      ^STRUCTURE             = "COSAC_FULL_HK_SC.FMT"
      COLUMNS                = 92
      ROW_BYTES              = 790
```

```
  END_OBJECT                = COSAC_FULL_HK_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 38
  RECORD_BYTES              = 152
  ^COSAC_ADC_GC_TABLE       = ("COS_FGMS2_041006193328_ADGC.TAB")
  OBJECT                    = COSAC_ADC_GC_TABLE
      NAME                  = ADC_MS
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 38
      ^STRUCTURE            = "COSAC_ADC_GC.FMT"
      COLUMNS               = 17
      ROW_BYTES             = 152
  END_OBJECT                = COSAC_ADC_GC_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 85
  RECORD_BYTES              = 139
  ^COSAC_ADC_MS_TABLE       = ("COS_FGMS2_041006193328_ADCM.TAB")
  OBJECT                    = COSAC_ADC_MS_TABLE
      NAME                  = ADC_MS
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 85
      ^STRUCTURE            = "COSAC_ADC_MS.FMT"
      COLUMNS               = 16
      ROW_BYTES             = 139
  END_OBJECT                = COSAC_ADC_MS_TABLE
END_OBJECT                  = FILE

OBJECT                      = FILE
  RECORD_TYPE               = FIXED_LENGTH
  FILE_RECORDS              = 14
  RECORD_BYTES              = 15
  ^COSAC_TIME_ID_TABLE      = ("COS_FGMS2_041006193328_TIME.TAB")
  OBJECT                    = COSAC_TIME_ID_TABLE
      NAME                  = TIME_ID
      INTERCHANGE_FORMAT    = ASCII
      ROWS                  = 14
      ^STRUCTURE            = "COSAC_TIME_ID.FMT"
      COLUMNS               = 2
      ROW_BYTES             = 15
  END_OBJECT                = COSAC_TIME_ID_TABLE
END_OBJECT                  = FILE

OBJECT                        = FILE
  RECORD_TYPE                 = FIXED_LENGTH
  FILE_RECORDS                = 112000
  RECORD_BYTES                = 66
  ^COSAC_MS_SPECTRUM_2_TABLE  = ("COS_FGMS2_041006193328_MSID.TAB")
  OBJECT                      = COSAC_MS_SPECTRUM_2_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 112000
      ^STRUCTURE              = "COSAC_MS_SPECTRUM_2.FMT"
      COLUMNS                 = 5
      ROW_BYTES               = 66
  END_OBJECT                  = COSAC_MS_SPECTRUM_2_TABLE
```

```
END_OBJECT                    = FILE

OBJECT                        = FILE
  RECORD_TYPE                 = FIXED_LENGTH
  FILE_RECORDS                = 4096
  RECORD_BYTES                = 98
  ^COSAC_GC_SPECTRUM_2_TABLE  = ("COS_FGMS2_041006193328_GCID.TAB")
  OBJECT                      = COSAC_GC_SPECTRUM_2_TABLE
      NAME                    = MS_ID
      INTERCHANGE_FORMAT      = ASCII
      ROWS                    = 4096
      ^STRUCTURE              = "COSAC_GC_SPECTRUM_2.FMT"
      COLUMNS                 = 8
      ROW_BYTES               = 98
  END_OBJECT                  = COSAC_GC_SPECTRUM_2_TABLE
END_OBJECT                    = FILE

END
```

11 Appendix G : Example of Directory Listing of Data Set RL-CAL-COSAC-2-CVP-V1.0

```
|-AAREADME.TXT
|
|               |-BROWINFO.TXT
|               |-COS_FGMS2_041006193320_I01.LBL
|               |-COS_FGMS2_041006193320_I01.PNG
|               |-COS_FGMS2_041006193320_I02.LBL
|               |-COS_FGMS2_041006193320_I02.PNG
|               |-COS_FGMS2_041006193320_I03.LBL
|               |-COS_FGMS2_041006193320_I03.PNG
|               |-COS_FGMS2_041006193320_I04.LBL
|               |-COS_FGMS2_041006193320_I04.PNG
|               |-COS_FGMS2_041006193320_I05.LBL
|               |-COS_FGMS2_041006193320_I05.PNG
|               |-COS_FGMS2_041006193320_I06.LBL
|               |-COS_FGMS2_041006193320_I06.PNG
|               |-COS_FGMS2_041006193320_I07.LBL
|               |-COS_FGMS2_041006193320_I07.PNG
|               |-COS_FGMS2_041006193320_I08.LBL
|               |-COS_FGMS2_041006193320_I08.PNG
|               |-COS_FGMS2_041006193320_I09.LBL
|               |-COS_FGMS2_041006193320_I09.PNG
|-BROWSE-------|-COS_FGMS2_041006193320_I10.LBL
|               |-COS_FGMS2_041006193320_I10.PNG
|               |-COS_FGMS2_041006193320_I11.LBL
|               |-COS_FGMS2_041006193320_I11.PNG
|               |-COS_FGMS2_041006193320_I12.LBL
|               |-COS_FGMS2_041006193320_I12.PNG
|               |-COS_FGMS2_041006193320_I13.LBL
|               |-COS_FGMS2_041006193320_I13.PNG
|               |-COS_FGMS2_041006193320_I14.LBL
|               |-COS_FGMS2_041006193320_I14.PNG
|               |-COS_FGMS2_041006193320_I15.LBL
|               |-COS_FGMS2_041006193320_I15.PNG
|               |-COS_FMSS2_041005234745_I01.LBL
|               |-COS_FMSS2_041005234745_I01.PNG
|               |-COS_FMSS2_041005235029_I01.LBL
|               |-COS_FMSS2_041005235029_I01.LBL
|               |-COS_FMSS2_041005235419_I01.LBL
|               |-COS_FMSS2_041005235419_I01.PNG
|               |-COS_FMSS2_041006190521_I01.LBL
|               |-COS_FMSS2_041006190521_I01.PNG
```

```
                                |
                                |
                                |                |-CATINFO.TXT
                                |                |-DATASET.CAT
                                |-CATALOG--------|-INST.CAT
                                |                |-INSTHOST.CAT
                                |                |-MISSION.CAT
                                |                |-PERSON.CAT
                                |                |-REF.CAT
                                |                |-SOFTWARE.CAT
                                |
                                |                |-COS_FGMS2_041006193320_0004.LBL
                                |                |-COS_FGMS2_041006193320_ADCM.TAB
                                |                |-COS_FGMS2_041006193320_ADGC.TAB
                                |                |-COS_FGMS2_041006193320_CONF.TAB
                                |                |-COS_FGMS2_041006193320_GCID.TAB
                                |                |-COS_FGMS2_041006193320_HKID.TAB
                                |                |-COS_FGMS2_041006193320_MSID.TAB
                                |                |-COS_FGMS2_041006193320_TIME.TAB
                                |                |-COS_FMSS2_041005234745_0000.LBL
                                |                |-COS_FMSS2_041005234745_ADCM.TAB
                                |                |-COS_FMSS2_041005234745_CONF.TAB
                                |                |-COS_FMSS2_041005234745_HKID.TAB
                                |                |-COS_FMSS2_041005234745_MSID.TAB
                                |                |-COS_FMSS2_041005234745_TIME.TAB
                                |                |-COS_FMSS2_041005235029_0000.LBL
                                |-DATA-----------|-COS_FMSS2_041005235029_ADCM.TAB
                                |                |-COS_FMSS2_041005235029_CONF.TAB
                                |                |-COS_FMSS2_041005235029_HKID.TAB
                                |                |-COS_FMSS2_041005235029_MSID.TAB
|-RL-CAL-COSAC-2-CVP-V1.0-|                |-COS_FMSS2_041005235029_TIME.TAB
                                |                |-COS_FMSS2_041005235419_0000.LBL
                                |                |-COS_FMSS2_041005235419_ADCM.TAB
                                |                |-COS_FMSS2_041005235419_CONF.TAB
                                |                |-COS_FMSS2_041005235419_HKID.TAB
                                |                |-COS_FMSS2_041005235419_MSID.TAB
                                |                |-COS_FMSS2_041005235419_TIME.TAB
                                |                |-COS_FMSS2_041006190521_0000.LBL
                                |                |-COS_FMSS2_041006190521_ADCM.TAB
                                |                |-COS_FMSS2_041006190521_CONF.TAB
                                |                |-COS_FMSS2_041006190521_HKID.TAB
                                |                |-COS_FMSS2_041006190521_MSID.TAB
                                |                |-COS_FMSS2_041006190521_TIME.TAB
                                |
                                |                |-COSAC.LBL
                                |                |-COSAC.PDF
                                |                |-COSAC_CALIBRATION_DESC.LBL
                                |                |-COSAC_CALIBRATION_DESC.TXT
                                |                |-DOCINFO.TXT
                                |                |-EAICD_COSAC.LBL
                                |                |-EAICD_COSAC.PDF
                                |-DOCUMENT-------|-RO-LCO-IF-340001.LBL
                                |                |-RO-LCO-IF-340001.PDF
                                |                |-TIMELINE_CVP.TXT
                                |                |-TIMELINE_CVP_DESC.TXT
                                |                |-TIMELINE_CVP_PART1.LBL
                                |                |-TIMELINE_CVP_PART1.PNG
                                |                |-TIMELINE_CVP_PART2.LBL
                                |                |-TIMELINE_CVP_PART2.PNG
                                |
                                |-EXTRAS---------|-COSAC_EGSE---------|-EGSE2005.EXE
                                |                |-EXTRINFO.TXT
                                |
                                |                |-BROWSE_INDEX.LBL
                                |                |-BROWSE_INDEX.TAB
                                |-INDEX----------|-INDXINFO.TXT
```

```
|                |-INDEX.LBL
|                |-INDEX.TAB
|
|                |-COSAC_ADC_GC.FMT
|                |-COSAC_ADC_MS.FMT
|                |-COSAC_CALIBRATED_HK.FMT
|-LABEL----------|-COSAC_CONFIG.FMT
|                |-COSAC_FULL_HK_SC.FMT
|                |-COSAC_GC_SPECTRUM_2.FMT
|                |-COSAC_MS_SPECTRUM_2.FMT
|                |-COSAC_TIME_ID.FMT
|                |-LABINFO.TXT
|
|
|-VOLDESC.CAT
```

12 Appendix H : PDS Glossary

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

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

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

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

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