

European Space Agency  
Research and Science Support Department  
Planetary Missions Division

---

**Rosetta - MIRO**

To Planetary Science Archive Interface Control  
Document

RO-MIR-IF-0001

Version 1.9

(November 2010)

Prepared by: Michael A Janssen and Lucas Kamp

Approved by: Samuel Gulkis



**Change Log**

<b>Date</b>	<b>Sections Changed</b>	<b>Reasons for Change</b>
2003-Aug-12	all	Initial version
2003-Sep-09	many	EDITS AS A RESULT OF PDS TELECON
2003-Nov	2,4	
2003-Dec	Changed doc.ID from UoB-IF-1234 to MIR-IF-0001.  Updated keywords in 4.2 & App.1 per latest Archive Plan.	
2004-Jul	3-6	Corrections after review of sample label
2005-Dec	All	Revisions for delivery of groundtesting archive
2006-Nov	All	Revisions after PDS Internal Review and for delivery of calibrated data.
2006-Dec-11	Section 3.4.2I	Updated delivery dates and added items per email from Maud Barthelemy
2007-May-09	Sections 3.2.3 and 4.2  Section 5	Added documentation of coordinate systems used.  Changed VOLUME keywords per revised Archive Conventions
2007-Oct-22	1.5, 2.3.4, 3.2.2, 3.4, 4.2, 6, 5	Added explanation of Times in data files, changes to labels and delivery contents, and revised structure files.
2008-Sep-02	Section 4.4 added, Section 7 revised	PDS review requested more documentation of data formats.
2009-May-15	6.4	Removed GMT field from Level-3 continuum files

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 4

---

2010-Nov-04	2.3.3.4  3.4.2  4.4  6.2, 6.4	Added reference to Geometry files.  Updated list of archive datasets  Updated for change to Level-3 files (UTC added)  Added UTC field to Level-3 data files
-------------	---	--

## TABLE OF CONTENTS

<b>1 INTRODUCTION .....</b>	<b>7</b>
1.1 PURPOSE AND SCOPE .....	7
1.2 ARCHIVING AUTHORITIES .....	7
1.3 CONTENTS .....	7
1.4 INTENDED READERSHIP .....	8
1.5 APPLICABLE DOCUMENTS .....	8
1.6 RELATIONSHIPS TO OTHER INTERFACES .....	8
1.7 ACRONYMS AND ABBREVIATIONS .....	8
1.8 CONTACT NAMES AND ADDRESSES .....	10
<b>2 OVERVIEW OF PROCESS AND PRODUCT GENERATION.....</b>	<b>11</b>
2.1 MIRO OVERVIEW AND OBJECTIVES.....	11
2.2 INSTRUMENT DESCRIPTION SUMMARY.....	11
2.3 DATA PRODUCTS DESCRIPTION .....	12
2.3.1 Introduction.....	12
2.3.2 Major Data Modes.....	13
2.3.3 Calibration and Test Data.....	14
2.3.3.1 Thermal-Vacuum Ground Tests.....	14
2.3.3.2 Radiometric Calibration.....	14
2.3.3.3 Frequency Calibration .....	14
2.3.3.4 Geometric Calibration.....	14
2.3.4 Operational Scenarios.....	16
2.3.5 Data Flows .....	16
<b>3 ARCHIVE FORMAT AND CONTENT.....</b>	<b>18</b>
3.1 FORMAT .....	18
3.1.1 Volume Format.....	18
3.1.2 Data Set Naming .....	18
3.1.3 File Name Formats .....	18
3.2 STANDARDS USED IN DATA PRODUCT GENERATION.....	19
3.2.1 PDS Standards .....	19
3.2.2 Time Standards.....	19
3.2.3 Reference Systems .....	20
3.3 DATA VALIDATION .....	20
3.4 CONTENT .....	20
3.4.1 Volume Set .....	20
3.4.2 Data Set.....	20
3.4.3 Directories .....	21
3.4.3.1 Root Directory.....	21
3.4.3.2 Calibration Directory.....	22
3.4.3.3 Catalog Directory .....	22
3.4.3.4 Data Directory .....	23
3.4.3.5 Index Directory .....	23
3.4.3.6 Label Directory .....	24
3.4.3.7 Document Directory .....	24
3.4.3.8 Geometry Directory.....	24

3.4.3.9 Software Directory.....	25
3.4.4 Data and Label Files .....	25
<b>4. DETAILED INTERFACE SPECIFICATIONS.....</b>	<b>26</b>
4.1 Data Product Identification .....	26
4.2 PDS Label Structure, Definition and Format.....	26
4.3 Overview of Detectors.....	28
4.3.1 Spectrometer data .....	28
4.3.2 Radiometer data. ....	28
4.3.3 Engineering data.....	28
4.4 Data Format Description.....	28
<b>5. APPENDIX 1: VOLDESC.CAT .....</b>	<b>30</b>
<b>6. APPENDIX 2: STRUCTURE FILES .....</b>	<b>31</b>
6.1 Spectroscopic Level 2 Data .....	31
6.2 Spectroscopic Level 3 Data .....	33
6.3 Continuum Level 2 Data .....	38
6.4 Continuum Level 3 Data .....	41
6.5 Housekeeping Data .....	44
<b>7. APPENDIX 3: AVAILABLE SOFTWARE TO READ PDS FILES.....</b>	<b>64</b>
<b>8. APPENDIX 4: DIRECTORY LISTING OF DATA SET MIRO_THERMALVAC .....</b>	<b>64</b>

## 1 Introduction

### 1.1 Purpose and Scope

The purpose of this EAICD (Experimenter to Planetary Science Archive Interface Control Document) is twofold. First it provides users of the MIRO instrument with detailed description of the products and a description of how they were generated, including data sources and destinations. Secondly, the EAICD describes the interface to the Planetary Science Archive (PSA) of ESA and is the official document between each experimenter team and the PSA.

### 1.2 Archiving Authorities

The Planetary Data System (PDS) 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 online Planetary Science Archive (PSA) was implemented

- 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 will offer the creation of physical archive volumes on request.

### 1.3 Contents

This document describes the data flow of the MIRO instrument on Rosetta from the s/c until the insertion into the PSA. 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.

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 MIRO science, software development and engineering team, the staff of the Planetary Science Archive design team, and any potential user of MIRO data.

## 1.5 Applicable Documents

AD1 Rosetta Archive Generation, Validation and Transfer Plan, 10 January 2006, RO-EST-PL-5011, Issue 2, Revision 3

AD2 Planetary Data System Standards Reference, 1 August 2003, Version 3.6, JPL D-7669, Part 2

AD3 Planetary Data System Data Dictionary Document, 28 August 2002, Revision E, JPL D-7116

AD4 MIRO Users Manual, RO-MIR-PR-0030

AD5 Acton, C.H.; "Ancillary Data Services of NASA's Navigation and Ancillary Information Facility," Planetary and Space Science, Vol. 44, No. 1, pp. 65-70, 1996.

AD6 Backus, C. and Gulkis, S., "CTS: Frequency Response as a Function of Temperature"

AD7 Rosetta Time Handling, 28 February 2006, RO-EST-TN-3165, Issue 1, Revision 1

## 1.6 Relationships to Other Interfaces

The controlling document of the interfaces discussed here is AD1. For further details on the MIRO instrument and its usage, see AD4.

## 1.7 Acronyms and Abbreviations

bps	bits per second
CCSDS	Consultative Committee for Space Data Systems
CODMAC	Committee on Data Management and Computation
CTS	Chirp Transform Spectrometer
DBMS	Database Management System
DDS	Data Distribution System (Darmstadt, Germany)
DVD	Digital Video Disk
ESA	European Space Agency
GHz	GigaHertz ( $10^9$ Hz)
HSK	Housekeeping
IFP	Intermediate Frequency Processor
JPL	Jet Propulsion Laboratory (Pasadena, CA)
KHz	kiloHertz ( $10^3$ Hz)
LO	Local Oscillator
MHz	MegaHertz ( $10^6$ Hz)
MM	millimeter
MIRO	Microwave Instrument for the Rosetta Orbiter
NAIF	Navigation and Ancillary Information Facility
NASA	National Aeronautics and Space Agency (USA)
OBT	On-Board Time



**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 9

---

PDS Planetary Data System  
PSA Planetary Science Archive  
rms root mean square  
SUBMM submillimeter  
TDB Barycentric Dynamical Time  
USO Ultra Stable Oscillator  
UTC Coordinated Universal Time

## 1.8 Contact Names and Addresses

Last Name	First Name	Institution	Phone	Email
Backus	Charles	JPL	818 354-4543	charles.r.backus@jpl.nasa.gov
Frerking	Margaret	JPL	818 354-4902	margaret.a.frerking@jpl.nasa.gov
Gulkis	Samuel	JPL	818 354-5708	samuel.gulkis@jpl.nasa.gov
Janssen	Michael	JPL	818 354-7247	michael.a.janssen@jpl.nasa.gov
Kamp	Lucas	JPL	818 354-4461	lucas.w.kamp@jpl.nasa.gov
Nowicki	Robert	JPL	818 393-5953	robert.m.nowicki@jpl.nasa.gov

## 2 Overview of Process and Product Generation

### 2.1 MIRO Overview and Objectives

The MIRO investigation addresses the nature of the cometary nucleus, outgassing from the nucleus and development of the coma as strongly interrelated aspects of cometary physics, and searches for outgassing activity on asteroids. MIRO is configured both as a continuum and a very high spectral resolution line receiver. Center-band operating frequencies are near 188 GHz (1.6 mm) and 562 GHz (0.5 mm). Spatial resolution of the instrument at 562 GHz is approximately 5 m at a distance of 2 km from the nucleus; spectral resolution is sufficient to observe individual, thermally broadened, line shapes at all temperatures down to 10 K or less. Four key volatile species - H<sub>2</sub>O, CO, CH<sub>3</sub>OH, and NH<sub>3</sub>—and the isotopes—H<sub>2</sub><sup>17</sup>O and H<sub>2</sub><sup>18</sup>O—are pre-programmed for observation. The primary retrieved products are abundance, velocity, and temperature of each species, along with their spatial and temporal variability. This information will be used to infer coma structure and processes, including the nature of the nucleus/coma interface.

MIRO will sense the subsurface temperature of the nucleus to depths of several centimeters or more using the continuum channels at millimeter and submillimeter wavelengths. Model studies will relate these measurements to electrical and thermal properties of the nucleus and address issues connected to the sublimation of ices, ice and dust mantle thickness, and the formation of gas and dust jets. The global nature of these measurements will allow in situ lander data to be extrapolated globally, while the long duration of the mission will allow us to follow the time variability of surface temperatures and gas production. Models of the thermal emission from comets are very crude at this time since they are only loosely constrained by data. MIRO will offer the first opportunity to gather subsurface temperature data that can be used to test thermal models. MIRO is highly complementary to the IR mapping instrument on the orbiter, having similar spatial resolution but greater depth penetration.

### 2.2 Instrument Description Summary

The MIRO instrument will provide both very sensitive continuum capability for temperature determination and extremely high-resolution spectroscopy for observation of molecular species. The instrument consists of two heterodyne radiometers, one at millimeter wavelengths (1.3 mm) and one at submillimeter wavelengths (0.5 mm). The millimeter and the sub-millimeter radiometers have continuum bandwidths of 0.5 GHz and 1.0 GHz respectively in addition, the submillimeter receiver has a total spectroscopic bandwidth of 180 MHz and a spectral resolution of 44 kHz. In the spectroscopic mode, 4096 channels, each having a bandwidth of 44 kHz, are observed simultaneously.

The performance parameters that govern the MIRO instrument design include system sensitivity, spatial resolution, radiometric accuracy (both absolute and relative), beam pattern and pointing accuracy, together with the mass, power, volume envelope, and environmental conditions available within the spacecraft. The MIRO instrument performance characteristics are summarised in Table 2.2. More detailed information can be found in the MIRO User Manual (AD4).

Equipment	Property	Millimeter-Wave	Submillimeter-Wave
Telescope	Primary Diameter Primary F/D Sidelobes Spatial Resolution Footprint size (at 2 km)	30 cm 1 -30 dB 24 arcmin ~15 m	30 cm 1 -30 dB 8 arcmin ~5 m
Spectral Performance	Frequency Band 1 <sup>st</sup> IF Bandwidth 1 <sup>st</sup> IF Frequency Range Spectral Resolution Allocated Spectral Range per line Accuracy	188.5–191.5 GHz 550 MHz 1–1.5 GHz n/a n/a n/a	547.5–580.5 GHz 11 GHz 5.5–16.5 GHz 44 kHz nominally 20 MHz 10 kHz
Spectrometer	Center Frequency/Bandwidth Number of channels	n/a n/a	1350/180 MHz 4096
Radiometric Performance	DSB Receiver Noise Temperature SSB Spectroscopic Sensitivity (300 KHz, 2 min) : relative absolute Continuum Sensitivity (1 sec): relative absolute	800 K  n/a n/a  1 K rms 3 K rms	3800 K  2 K rms 3 K rms  1 K rms 3 K rms
Data Rates	Instantaneous Rate Continuum Mode Spectroscopic Mode On-board Storage	<1 kbps 2 kbps 0.2 GB (one day's data volume, Mode 3, 100% duty cycle)	

Table 2.2. MIRO Instrument Performance Characteristics

## 2.3 Data Products Description

### 2.3.1 Introduction

The MIRO instrument has 6 major modes of operation and data-taking that reflect operational combinations of its two continuum radiometers and the spectrometer, engineering mode, millimeter continuum mode, submillimeter continuum mode, dual continuum mode, CTS/submillimeter continuum mode, and CTS/dual continuum mode. In addition, a special mode has been designed for planetary and asteroid flybys. A number of data compression options are obtained in each mode by varying the data-taking rate (integration time per sample) and/or spectral resolution of the radiometers and

spectrometer. The specific parameters for each mode are described in more detail in the MIRO User Manual (AD4), Volume 6.1, and are summarized here.

All data files that will be delivered to the PSA are table files, consisting of time sequences of measured data. This applies to engineering (housekeeping), continuum and spectroscopic data, both raw and calibrated. (The detailed structure of these files is defined by the Structure Files listed in Appendix 2.) It is anticipated that, in the future, derived products will be generated in image, cube or map format, but these formats have not yet been defined and there are no plans to archive such products.

### 2.3.2 Major Data Modes

#### Engineering Mode

In engineering mode the MIRO software is collecting engineering data from 56 internal sensors. The sampling of these sensors is at a 5 Hz rate. All engineering measurements are 12-bit A/D converted values. The engineering mode telemetry is sent to the spacecraft in the form of a housekeeping telemetry packet. One engineering telemetry packet is typically generated every 11 seconds.

#### Millimeter Continuum Mode

In millimeter continuum mode continuum data are collected from the millimeter radiometer at a 20 Hz rate. All continuum data consist of 16-bit values. The millimeter continuum data are nominally packetized into science telemetry packets every 10 seconds. A 'summing value' parameter can cause the MIRO software to sum either 1, 2, 5, 10 or 20 separate continuum values prior to putting them into the telemetry packet. This feature can reduce the data rate to as little as one millimeter continuum packet every 200 seconds.

#### Submillimeter Continuum Mode

Sub-millimeter continuum mode is identical to the millimeter continuum mode in data collection and packing except that a different set of electronics is powered on. Millimeter and submillimeter continuum data are contained in separate science telemetry packets, identified by a field in the source data header.

#### Dual Continuum Mode

In dual continuum mode the millimeter and submillimeter continuum are collected simultaneously. When running in dual continuum mode, the summing value parameter mentioned earlier is applied to both sets of data, causing equal amounts of millimeter and submillimeter data to be generated.

#### CTS / Submillimeter Continuum Mode

This mode adds the collection of chirp transform spectrometer (CTS) data. The CTS is programmed by the MIRO software to run for an initial sub-integration period of approximately 5 seconds. An internal LO frequency generator is then switched, which has the effect of introducing a small shift in the frequencies, and another 5 second period is observed. These pairs of observations are repeated with the respective results being summed over time. Selectable integration periods are 30, 60, 90 and 120 seconds. The data from the two LO frequencies are then subtracted from each other to provide a single 4096-element difference spectrum.

The 4096 data values can be further reduced by application of a smoothing function whereby data from several channels are combined and weighted to produce fewer final channels. Smoothing window sizes are 1, 5, 7 and 9 channels. A mask is applied to the CTS data and only 12 bits of each resulting measurement are returned.

CTS data collection and the LO frequency switching is coordinated with the collection of continuum data. Exactly 100 continuum samples are taken during each CTS scan. Upon receipt of the data on the ground it is known at which LO frequency all of the continuum measurements were made.

If the CTS has just been powered on, an internal calibration of the CTS is performed. This consists of loading the 4 CTS sum of square tables with a linear ramping pattern. A 10,000 cycle integration is then performed and the resulting data read out. The data are then averaged to yield the mid-point of the table. The resulting mid-point values for each table are downlinked in telemetry packets for monitoring over time.

### CTS / Dual Continuum Mode

This is the same as the CTS / SMM continuum mode except that the millimeter data are also collected.

### Asteroid Mode

This special data-taking mode has been implemented for the asteroid and planetary encounters to enable MIRO to follow the rapid Doppler shift of spectral lines that may be visible. The primary characteristic of this mode is that LO frequency switching is turned off. The LO is set to either +5 MHz or - 5 MHz from the nominal frequency prior to the encounter. At the specified encounter time, the LO frequency is switched  $\pm 5$  Mhz (opposite from the first setting) from the nominal frequency. Continuum data are collected at 20 Hz. Each set of CTS data consists of a single 5-second integration with all 32 bits returned for each 4096 channels.

## 2.3.3 Calibration and Test Data

### 2.3.3.1 Thermal-Vacuum Ground Tests

These tests were carried out at JPL from 15 May to 29 June 2001 and were intended to determine characteristics of the MIRO instrument in vacuum conditions and as a function of temperature. The emphasis was on deriving parameters that cannot be obtained under ambient conditions, such as the noise figures of various electronic components, the frequency response of the instrument and the linearity of the response, and the stability of several features. The data obtained from these tests and the accompanying log files are delivered as the first MIRO archive dataset.

### 2.3.3.2 Radiometric Calibration

The MIRO instrument is calibrated on a periodic basis and immediately following every mode change. An automatic calibration will take place every 1895 seconds, if not interrupted by a mode change command, which triggers a calibration immediately. The normal interval of 1895 seconds allows 95 seconds for the calibration and 1800 seconds (30 minutes) for the data collection period. The 1800 seconds allows for complete integration periods of 30, 60, 90, and 120 seconds (60, 30, 20, and 15 integrations respectively).

The 95 seconds of calibration data are distributed as follows:

<b>Time(seconds)</b>	<b>Activity</b>
5	3 mirror movements/no data collection
30	Warm load position- CTS + continuum + engineering
30	Cold load position - CTS + continuum + engineering
30	Sky position - CTS + continuum + engineering

These calibration data are included in the level-2 data files as part of the time sequence. They are flagged by a Calibration field in the header columns (see the Structure files in Appendix 2).

Receiver gains (in counts per Kelvin) are computed by measuring the difference in the number of counts from the receiver as the input is switched between loads at two different (known) temperatures. Load temperature differences (in counts) are obtained by switching between 1) warm load and cold load, or 2) warm load and sky. The choice between cold load or sky is indicated by the "Type" field in each record, see Appendix 2. (In the current delivery, this field is missing from the continuum data, which were always calibrated using sky.) Data records are converted to temperature units by dividing by the number of counts per Kelvin. The temperature units reported are Rayleigh-Jeans temperature units, where the product  $kTB$  ( $k$  = Boltzmann's constant,  $B$  = bandwidth and  $T$  is the Rayleigh-Jeans temperature) is the received power. A factor of two multiplies the spectroscopic record to convert it to a single sideband. Fluctuations in the gains resulting from LO switching cause small offsets visible in the differenced spectroscopic data, which will be corrected for in future work. These errors are of the order of 5K, about 0.1% of the system temperatures.

#### 2.3.3.3 Frequency calibration

The frequency calibration of the CTS is a complex subject, described in AD6, which is included in this delivery as the file MIRO\_CTS\_FREQUENCY\_CALIBRATION\_V0 in the Document directory. The Receiver Frequency of the radiation entering the instrument (in the range 547.5 – 580.5 GHz, see Table 2.2) is translated by a series of mixers in the IFP to the frequency range of the CTS, centered at 1350 MHz. The relationship between IFP output frequency and channel number is a function of temperature. In the calibrated data in this delivery, the SPECT\_T1 field (see Appendix 2, Section 6.2) gives this temperature, which is always 67.9 C in this dataset, since that is the standard value to which the calibrated data have been rebinned.

#### 2.3.3.4 Geometric Calibration

Determination of the position and attitude of the instrument is done using data and software provided by the Navigation and Ancillary Information Facility (NAIF) group at JPL, see AD5. This group, in collaboration with the Flight Dynamics staff of ESA, regularly generates files containing the position and attitude of the Rosetta spacecraft, called "kernels": C (Camera) kernels contain the spacecraft attitude data, SP (Spacecraft and Planet) kernels contain the positions and velocities of the bodies. Other kernels generated by NAIF contain time information (leapseconds, conversion constants to the spacecraft clock), planetary constants (dimensions, rotation rates), and instrument characteristics (beamwidth, orientation relative to the spacecraft frame). The particular kernel files used in the processing for a given delivery are specified in the delivery documentation.

The orientation of the MIRO boresight relative to the Rosetta spacecraft frame that is contained in the NAIF Frames kernel for Rosetta was derived by the MIRO team from the Spiral scans of the Earth during the Commissioning phase.

The MIRO team has developed software which uses the NAIF kernels to allow appending of geometric information to all science data files, including, at each point in time, instrument boresight attitude and location of the boresight on the target body, if applicable. This information is included in delivered level-3 archive products as table files in the GEOMETRY directory of each archive.

### 2.3.4 *Operational Scenarios*

MIRO is planning to collect scientific and/or calibration data at every planetary and asteroid encounter and at the target comet. In addition, MIRO plans to gather calibration data during system checkout and cruise modes. The data will be limited during the planetary and asteroid flybys, but extensive during the various phases at the comet.

Normal mode of operation – In the normal mode of operation, the MIRO instrument will operate in a frequency switching mode. If the instrument is in a continuum only mode, the frequency switching is turned off.

Asteroid mode – A special data-taking mode, called the “Asteroid Mode”, has been implemented for the asteroid and planetary encounters. The primary characteristic of this mode is that LO frequency switching is turned off. The LO is set  $\pm 5$  MHz from the nominal frequency prior to the encounter. At the specified encounter time, the LO frequency is switched  $\pm 5$  Mhz (opposite from the first setting) from the nominal frequency. Continuum data are collected at 20 Hz. Each set of CTS data consists of a single 5-second integration with all 32 bits returned for each 4096 channels.

Mars and Earth flybys – There are likely to be separate scenarios designed for the Mars and Earth flybys. (Note added in Rev 1.6: MIRO did not participate in the Mars flyby.)

### 2.3.5 *Data Flows*

The MIRO telemetry packets coming from the spacecraft are retrieved from the ESOC Data Distribution System (DDS) at Darmstadt by PI-controlled workstations located at the Jet Propulsion Laboratory in Pasadena, CA, under the direct responsibility of the PI. The telemetry records will be written in their original SFDU formats for permanent safekeeping in the MIRO archival system at JPL. These telemetry records will be kept in the MIRO project but are not considered part of the formal science archive. The Data Archive has the following characteristics:

- 1) The MIRO Data Archive system is located at JPL in Pasadena, CA.
- 2) The Data Archive system has the capability to store and maintain all the data coming from ESA (instrument/science data, housekeeping data, auxiliary data, navigation data, command logs) in their original format (SFDFU format where applicable).
- 3) The Data Archive system is capable of transferring data to the MIRO data base management system (DBMS) for further processing.
- 4) The Data Archive system has the capability to store and maintain all the data in PDS format that will be delivered to the Small Bodies Node of the PDS.



All data (science, housekeeping and auxiliary) in the MIRO Raw Data Archive at JPL are capable of being ingested into the MIRO DBMS. This DBMS is the means of access to the data for team members doing science analysis of these data.

Delivery of data to the Rosetta Mission Archive of the PSA of ESA and the Small Bodies Node of the PDS of NASA is done by extracting data from the MIRO DBMS into file formats defined by this document and generating PDS labels for these files. These files are placed in directory trees in the MIRO Data Archive, along with all associated documentation and index tables. Compressed copies of these directories are delivered to the PSA and PDS for external archival and will also remain online in the MIRO Data Archive. The MIRO team will support the peer reviews of MIRO-related data that are conducted by the ESA-PDS archiving team and will correct or otherwise appropriately resolve any liens identified by the peer review(s).

The Small Bodies Node of PDS will work jointly with the archiving scientists at ESA to prepare the complete ROSETTA archive within ESA consistent with all PDS standards (see AD2). Ultimately the ROSETTA archive will reside both at ESA and with NASA's PDS. PDS and the ESA archiving scientists will carry out the peer review of all data to ensure that outside users can make good scientific use of the data from the archive. The final archive will be maintained electronically both by the PDS Small Bodies Node and by ESA. ESA will prepare CD ROM (or successor media such as DVD ROM) copies of the archive for distribution both through ESA and through PDS.

The raw data at JPL will receive a preliminary radiometric calibration. Further data reduction and data analysis will be carried out to provide calibrated data in standard formats and derived products such as maps of abundances or column densities. Co-Is will also have electronic access to the data from the database in Pasadena. Co-Is will also produce selected calibrated data sets and return them to the Pasadena database.

The MIRO science team will also produce, at the home institutions of the team members, derived products as appropriate. These might include spatial maps, rectified to a common coordinate system, of the abundances of specific molecules.

The MIRO team expects that the ROSETTA project may wish to combine data from MIRO with data from other instruments, particularly ALICE, OSIRIS or VIRTIS, on a single archive volume. This will considerably enhance the usability of the archive for scientific correlative analysis. Archive preparation of any such combination of data sets from different instruments will be the responsibility either of IDSS carrying out comparative studies or of the ROSETTA project within ESA.

## 3 Archive Format and Content

### 3.1 Format

This section describes the format of the MIRO Instrument Team Archive volumes. Data in the archive will be formatted in accordance with Planetary Data System specifications (AD2).

#### 3.1.1 Volume Format

This document will not be concerned with any particular media formats such as DVD's because data will be delivered electronically. When applicable, media formats will be determined by the PDS. Also, for present purposes, datasets will be regarded as equivalent to volumes.

#### 3.1.2 Data Set Naming

The informal Dataset Names used in this document are formed by appending the mission phase descriptor to the instrument name. Examples are:

MIRO\_THERMALVAC  
MIRO\_COMMISSIONING  
MIRO\_EARTH1

The formal PDS values for DATA\_SET\_NAME and DATA\_SET\_ID are formed according to the rules defined in AD1:

DATA\_SET\_NAME = "ROSETTA-ORBITER <target name> MIRO <processing level> <mission phase> <description> <version>".

Examples are:

"ROSETTA-ORBITER CAL MIRO 2 GRND THERMAL-VAC V1.0"  
"ROSETTA-ORBITER EARTH MIRO 2 EAR1 Earth-1 V1.0"

DATA\_SET\_ID = "RO-<target ID>-MIRO-<processing level>-<mission phase>-<description>-<version>".

Examples are:

"RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0"  
"RO-E-MIRO-2-EAR1-EARTH1-V1.0"

See further AD1 for allowed values for these items.

#### 3.1.3 File Name Formats

The following scheme will be used for names of files containing data products:

MIRO\_<level>\_<detector>\_begindatettime.<ext>

The level field is the CODMAC processing level.

Valid names for the detector field include:

MM  
SUBMM  
CTS  
HSK

File extensions can be at least:

DAT binary data  
TXT ascii data, lines of variable length, delimited typically with <CR>  
LBL ascii detached label file  
DOC text description where necessary

Datetime format will be yyyydddhhmmss, where ddd is 1-based Julian day, i.e. Jan 1 is day 1.

## 3.2 Standards Used in Data Product Generation

### 3.2.1 PDS Standards

The MIRO Data Products comply with the Planetary Data System standards for file formats and labels, as specified in the PDS Standards Reference (AD2).

### 3.2.2 Time Standards

The MIRO Data Products are intended to comply with the CCSDS Time Code Format Standard (CCSDS 301.0-B-2).

The On-Board Time (OBT) of the Rosetta spacecraft is used in the PDS keywords SPACECRAFT\_CLOCK\_START\_COUNT and SPACECRAFT\_CLOCK\_STOP\_COUNT. The format of this time (as defined in RO-EST-TN-3165, Rosetta Time Handling) is:

"i/mmmmmmmm[.nnnnn]"

where:

i = integer signifying which zero point is in use. (Currently, all OBTs have i=1, signifying that the zero point is at 2003-01-01T00:00:00 UTC. This integer will change if the clock is ever reset, which is not planned but may happen as a result of unforeseen circumstances.)

mmmmmmmm = integer seconds since the zero point.

nnnnn = (optional) fractional seconds in units of 1/65536 sec.

Therefore, the floating-point time since the zero point represented by a given OBT is:

time = mmmmmmmmm + nnnnn/65536.

The OBT is not used internally in any MIRO data files. Instead, table entries are marked by Sun Modified Julian Time (SMJT) or "unix time", which is elapsed seconds since 1970-01-01T00:00:00 UTC. This takes leapseconds into account and is therefore in the UTC system. The conversion from SMJT to Ephemeris Time (ET2000), which is the standard TDB time system used by NAIF, is given by:

$$ET2000 = SMJT - 946727958.816 + LEAPSECS + O(0.0017)$$

Where the last term represents a sinusoidal correction for the Earth's motion that never exceeds

0.0017 seconds, and LEAPSECS is the number of leapseconds that have been added between 1970 and the relevant date. At the time of writing, LEAPSECS = 24. A Fortran-77 program, named UTCCON, that converts between SMJT and the ISO standard UTC representation, is provided in the DOCUMENT directory. See AD7 for further discussion and conversions to other time systems.

### 3.2.3 Reference Systems

Geometric data such as spacecraft position are reported in the inertial cartesian coordinate frame of epoch J2000, with reference to either the Ecliptic (default) or a specified Target as center. Target-centered spherical coordinate systems use the standard planetocentric IAU frame. Further details may be found in the Mission Control System Data Delivery Interface Document (DDID), RO-ESC-IF-5003, Appendix H, FD Products. Values for geometric data reported in the labels are given for the time at the midpoint of the observations in the file.

## 3.3 Data Validation

General data validation procedures are described in the MIRO User Manual (AD4). No data validation has been performed on these products, beyond basic checks on the completeness of Continuum packets and CTS spectra. Validation done on higher-level products will be described in the delivery documentation.

## 3.4 Content

This section describes the directories and contents of the MIRO Data Product volumes, including the file names, file contents, file types, and organization responsible for providing the files. The data described herein appear on each volume of the MIRO Data Product volume series.

### 3.4.1 Volume Set

Since the Rosetta Project plans for electronic delivery and there is no need to bundle several datasets into one volume set, as a general rule, a volume shall be a dataset.

### 3.4.2 Data Set

The following table shows data set name (informal), DATA\_SET\_ID, delivery date, size, and data types contained, for each volume of the MIRO Data Product volume series through 2010. The naming follows section 3.1.2. For future deliveries (after Nov.2010, as of current writing), the sizes are approximate estimates and the delivery dates nominal.

Dataset name and DATA_SET_ID	Delivery Date	Size (Mbytes)	Description
MIRO_Thermalvac RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0	Nov 2006	763	Science Files, Engineering Files
MIRO_Commissioning (raw) RO-X-MIRO-2-CVP-COMMISSIONING-V1.0	Nov 2006	300	Science Files, Engineering Files
MIRO_Commissioning (calibrated) RO-X-MIRO-3-CVP-COMMISSIONING-V1.0	Nov 2006	325	Science Files, Geometry Files

MIRO_Earth1 (raw) RO-E-MIRO-2-EAR1-EARTH1-V1.0	Nov 2006	185	Science Files, Engineering Files
MIRO_Earth1 (calibrated) RO-E-MIRO-3-EAR1-EARTH1-V1.0	Nov 2006	197	Science Files, Geometry Files
MIRO_Tempel1 (raw) RO-C-MIRO-2-CR2-9P-TEMPEL1-V1.0	Dec 2006	660	Science Files, Engineering Files
MIRO_Tempel1 (calibrated) RO-C-MIRO-3-CR2-9P-TEMPEL1-V1.0	Dec 2006	765	Science Files, Geometry Files
MIRO_Earth2 (raw) RO-E-MIRO-2-EAR2-EARTH2-V1.0	Jun 2008	58	Science Files, Engineering Files,
MIRO_Earth2 (calibrated) RO-E-MIRO-3-EAR2-EARTH2-V1.0	Jun 2008	55	Science Files, Geometry Files
MIRO_Steins (raw) RO-A-MIRO-2-AST1-STEINS-V1.0	Jul 2009	54	Science Files, Engineering Files,
MIRO_Steins (calibrated) RO-A-MIRO-3-AST1-STEINS-V1.0	Jul 2009	47	Science Files, Geometry Files,
MIRO_Earth3 (raw) RO-E-MIRO-2-EAR3-EARTH3-V1.0	Nov 2010	150	Science Files, Engineering Files,
MIRO_Earth3 (calibrated) RO-E-MIRO-3-EAR3-EARTH3-V1.0	Nov 2010	170	Science Files, Geometry Files
MIRO_Lutetia (raw) RO-A-MIRO-2-AST2-LUTETIA-V1.0	Mar 2011	300	Science Files, Engineering Files
MIRO_Lutetia (calibrated) RO-A-MIRO-3-AST2-LUTETIA-V1.0	Mar 2011	420	Science Files, Geometry Files
MIRO_Rendezvous1 (raw) RO-X-MIRO-2-RVM1-RENDEZVOUS1-V1.0	Nov 2014	50	Science Files, Engineering Files
MIRO_Rendezvous1 (calibrated) RO-X-MIRO-3-RVM1-RENDEZVOUS1-V1.0	Nov 2014	70	Science Files, Geometry Files

### 3.4.3 Directories

This section describes the contents of each directory in a Data Product dataset.

#### 3.4.3.1 Root Directory

The following table lists the files located in the root directory.

File Name	File Contents
AAREADME.TXT	Introductory information about the contents and format of the volume.
CALIBRATION	Directory containing MIRO calibration data.
CATALOG	Directory containing catalog files: mission, instrument, and dataset Descriptions which are duplicated in the PDS higher-level catalog.
DATA	Root directory for each data type present in this volume: Science (Spectroscopic and Continuum) and Engineering.
DOCUMENT	Directory containing basic documentation.
ERRATA.TXT	Cumulative listing of comments and corrections.
GEOMETRY	Directory containing information about spacecraft and target positions and instrument attitude,
INDEX	Directory containing index tables for the data files in this volume.
LABEL	Directory containing structure files references by PDS labels.
SOFTWARE	Directory containing software to manipulate and display MIRO data.
VOLDESC.CAT	Description of the contents of this volume in a PDS-labelled format.

Appendix 1 contains a listing of the VOLDESC.CAT file for the first dataset listed in 3.4.2.

### 3.4.3.2 Calibration Directory

This directory is to contain the calibration files used to convert level 2 products to level 3. Since the MIRO calibration data are part of the normal telemetry stream and are included in the files in the DATA directory, at this time no separate calibration files exist. Therefore, this directory is omitted for both level-2 and level-3 archives in the current deliveries.

### 3.4.3.3 Catalog Directory

This directory contains files providing a top-level description of the Rosetta mission and spacecraft, the MIRO instrument and its team, and its data products.

The following table describes the files in the Catalog Directory.

File Name	File Contents
CATINFO.TXT	A description of the contents of this directory.
MISSION.CAT	PDS mission catalog information about the Rosetta.

TARGET.CAT	PDS catalog information about the target bodies observed by Rosetta.
INSTHOST.CAT	PDS instrument catalog information about the Rosetta Spacecraft.
INST.CAT	PDS instrument catalog information about the MIRO instrument.
PERSONNEL.CAT	PDS personnel catalog information about the MIRO Team members responsible for generating the data products.
REF.CAT	PDS references mentioned in other files.
SOFTWARE.CAT	PDS catalog information about software included in this archive (currently empty).
DATASET.CAT	PDS data set catalog information about the MIRO Data Product data sets.

#### 3.4.3.4 Data Directory

This directory contains three sub-directories, Spectroscopic, Continuum, and Engineering, which each contain all the data files for the corresponding data type in the data set.

##### 3.4.3.4.1 Continuum Data Directory

This directory contains science data files containing Continuum (MM and SMM) data, and their detached labels.

##### 3.4.3.4.2 Engineering Data Directory

This directory contains files containing Engineering data, and their detached labels.

##### 3.4.3.4.3 Spectroscopic Data Directory

This directory contains science data files containing Spectroscopic (CTS) data, and their detached labels.

#### 3.4.3.5 Index Directory

This directory contains index files providing summary information for all the data products in this data set.

The following table describes the files in the Index Directory.

File Name	File Contents
INDEX.LBL	A volume index file.
INDEXINFO.TXT	A description of the contents of this directory.
SPECINDX.TAB	Index table file for all Spectroscopic data products.

SPECINDEX.LBL	Detached label file describing the contents of specindx.tab.
CONTINDEX.TAB	Index table file for all Continuum data products.
CONTINDEX.LBL	Detached label file describing the contents of contindx.tab.
ENGINDEX.TAB	Index table file for all Engineering data products.
ENGINDEX.LBL	Detached label file describing the contents of engindx.tab.
GEOMINDEX.TAB	Index table file for all Geometry files (not present if data set includes no Geometry files).
GEOMINDEX.LBL	Detached label file describing the contents of geomindx.tab files (not present if data set includes no Geometry files).

#### 3.4.3.6 Label Directory

This directory includes files referenced by data files on this volume, e.g. FMT files containing header descriptions. Sample structure files used in MIRO PDS labels are given in Appendix 2.

#### 3.4.3.7 Document Directory

This directory contains various files documenting the contents of this data set.

The following table describes the files in the Document Directory.

File Name	File Contents
DOCINFO.TXT	A description of the contents of this directory.
MIRO_READ_DATA.ASC	A Fortran-77 program to list selected parts of MIRO data files, intended primarily as additional documentation for the structure files in Appendix 2.
UTCCON.ASC	A Fortran-77 program that converts between the time system used in the data files and standard UTC notation.

Other documents, as appropriate. E.g., in the Groundtesting delivery, log files of the tests are included.

#### 3.4.3.8 Geometry Directory

This directory contains files pertaining to the geometry and attitude information required to interpret or process any of the MIRO data in the delivery. It will be omitted if not necessary, e.g., for the Groundtesting dataset.



#### 3.4.3.9 Software Directory

It is intended that the software used to calibrate the data will be included in this directory for level-3 products. Currently, this software is in an early stage of development and is tied to the local database used by the processing, hence is not suitable for delivery to the archive at this time. The description of the algorithms in section 2.3.3.2 fulfills this function, for now. Therefore, this directory was omitted in the current deliveries.

#### *3.4.4 Data and Label Files*

Science and Engineering data files are placed in the appropriate subdirectories of the data directory (3.4.3.4), together with their detached labels. Other data files shall be placed in their appropriate directories, all with detached PDS label.

## 4. Detailed Interface Specifications

In this chapter, detailed information about the archive design at instrument and detector level is given.

### 4.1 Data Product Identification

The basic MIRO data product is a binary file containing scientific or ancillary data in table format, and an associated detached label file in PDS format describing the data. The filenaming convention for these files is given in 3.1.3.

A data file contains a continuous stream of data for one of the MIRO instruments (CTS, MM radiometer, or SUBMM radiometer) or for Engineering, see section 2.3. Note that the Data Mode in which the data were taken (section 2.3.2) is not relevant to the type of the data product, although the mode information for each row of the table is stored in the file. The length of a data file is arbitrary, being defined by the process of obtaining the data from the database, but it shall not exceed an observing time of one week

### 4.2 PDS Label Structure, Definition and Format

The following keywords are used in the PDS labels for MIRO data products (with the values given when these will be invariant):

```
PDS_VERSION_ID = PDS3
LABEL_REVISION_NOTE
RECORD_TYPE = FIXED_LENGTH
RECORD_BYTES
FILE_RECORDS
^TABLE
DATA_SET_NAME
DATA_SET_ID
MISSION_NAME = "INTERNATIONAL ROSETTA MISSION"
MISSION_ID = ROSETTA
INSTRUMENT_HOST_NAME = "ROSETTA ORBITER"
INSTRUMENT_HOST_ID = RO
INSTRUMENT_NAME = "MICROWAVE INSTRUMENT FOR THE ROSETTA ORBITER"
INSTRUMENT_ID = MIRO
INSTRUMENT_TYPE = {"RADIOMETER","SPECTROMETER"}
^INSTRUMENT_DESCRIPTION = "RO-MIR-IF-0001_16.TXT"
INSTRUMENT_MODE_ID
INSTRUMENT_MODE_DESC
TARGET_NAME
TARGET_TYPE
MISSION_PHASE_NAME
ORBIT_NUMBER
SPACECRAFT_CLOCK_START_COUNT
SPACECRAFT_CLOCK_STOP_COUNT
START_TIME
STOP_TIME
SC_SUN_POSITION_VECTOR
SC_TARGET_POSITION_VECTOR
```

SC\_TARGET\_VELOCITY\_VECTOR  
SUB\_SPACECRAFT\_LATITUDE  
SUB\_SPACECRAFT\_LONGITUDE  
SPACECRAFT\_ALTITUDE  
NOTE = “

The values of the keywords SC\_SUN\_POSITION\_VECTOR,  
SC\_TARGET\_POSITION\_VECTOR and SC\_TARGET\_VELOCITY\_VECTOR  
are related to the ECLIPJ2000 reference frame.  
The values of SUB\_SPACECRAFT\_LATITUDE and SUB\_SPACECRAFT\_LONGITUDE  
are northren latitude and eastern longitude in the standard  
planetocentric IAU <TARGET\_BODY> frame.  
All values are computed for the time 20xx-xx-xxTxx:xx:xx.xxx,  
the midpoint of the observations.  
Distances are given in <km>, velocities in <km/s>, angles in <deg>.”

PRODUCT\_CREATION\_TIME  
PRODUCT\_ID  
PRODUCT\_TYPE  
PROCESSING\_LEVEL\_ID  
PRODUCER\_FULL\_NAME = “Dr. Samuel Gulkis”  
PRODUCER\_INSTITUTION\_NAME = “JET PROPULSION LABORATORY”  
PRODUCER\_ID = JPL  
DATA\_QUALITY\_ID  
DATA\_QUALITY\_DESC = “1 = nominal, 2 = problematical”  
OBJECT = TABLE  
INTERCHANGE\_FORMAT = BINARY  
COLUMNS  
ROWS  
ROW\_BYTES  
^STRUCTURE = “xxxx.FMT”  
END\_OBJECT = TABLE  
END

The FMT file pointed to by the ^STRUCTURE keyword will be one of the five files in Appendix 2 (see 3.4.3.6). These contain the detailed specification of the contents of the data.

The file pointed to by the ^INSTRUMENT\_DESCRIPTION resides in the Document directory (3.4.3.7).

No mission-specific keywords will be used. All keywords are defined in the PDS data dictionary (AD3 or online at [http://pds.nasa.gov/tools/data\\_dictionary\\_lookup.cfm](http://pds.nasa.gov/tools/data_dictionary_lookup.cfm)).

The coordinate system used for the geometric items in the label (SC...VECTOR) ia the J2000 system, which is an inertial cartesian frame based on the Earth mean equator of Epoch J2000.

## **4.3 Overview of Detectors**

### **4.3.1 Spectrometer data**

The contents of the spectrometer (CTS) level-2 and level-3 data products are fully defined by the structure files CTS\_LEVEL\_2\_FORMAT.FMT, listed in Appendix 6.1, and CTS\_LEVEL\_3\_FORMAT.FMT, listed in Appendix 6.2.

Sample record printouts generated by the program MIRO\_READ\_DATA found in the DOCUMENT directory are also shown in those appendices.

For further details, see MIRO User Manual (AD4) 6.2.3.

### **4.3.2 Radiometer (continuum) data**

The contents of the mm and submm radiometer level-2 and level-3 data products are fully defined by the structure files CONT\_LEVEL\_2\_FORMAT.FMT, listed in Appendix 6.3 and CONT\_LEVEL\_3\_FORMAT.FMT, listed in Appendix 6.4.

Sample record printouts generated by the program MIRO\_READ\_DATA found in the DOCUMENT directory are also shown in those appendices.

For further details, see MIRO User Manual (AD4) 6.2.4 and 6.2.5.

### **4.3.3 Engineering data**

The contents of the Engineering data products are fully defined by the structure file ENG\_LEVEL\_2\_FORMAT.FMT, listed in Appendix 6.5.

A sample record printout generated by the program MIRO\_READ\_DATA found in the DOCUMENT directory is also shown in that appendix.

For further details, see MIRO User Manual (AD4) 6.2.2.

## **4.4 Data Format Description**

The contents of the MIRO data files are fully defined by the \*.FMT files in the LABEL directories of the archives. Here, a brief explanation is provided of the science-data portion of CTS and Continuum files. (The Engineering files are not discussed further as they are not likely to be of interest to the general user.)

It is important to understand that the Data column of the MIRO science files contains a large data array in each row. In the CTS files, this contains a complete spectrum, whereas in the Continuum files this is a packet of data in time order. The name of the Data column is SPECTRAL\_DATA in the CTS files, but simply D in the Continuum files.

The layout of a MIRO science file can be viewed as a 2-D array with N rows (where N is the value of the FILE\_RECORDS keyword in the label), each row containing M entries, with a "header" on the left-hand side, consisting of the columns preceding the Data column of the table).

For Level-3 CTS files: M = 4250 spectral items and the header contains 19 items;

for Level-2 CTS files: M = 4096 spectral items and the header contains 10 items, one of which is itself an array of 24 items;

for Level-3 Continuum files: M = 200 data items and the header contains 13 items;

for Level-2 Continuum files: M = 200 data items and the header contains 12 items.

When program MIRO\_READ\_DATA (see Section 3.4.3.7) is used in the "formatted output" mode, it prints, for each row, one entry each for the header columns and then four entries for the Data column, starting with the "starting data item #" that the program prompts for. (Four was picked for the number of entries arbitrarily, just to give a representative sample.) When the program is run in "average spectrum" mode, then it prints all entries of the Data column to a file, averaged over the rows specified. This allows the user to save these data for purposes of plotting or analysis. (The averaging feature is most useful for the CTS data, while for Continuum data single packets are more meaningful.)

A very important item is the Cal/No-cal flag in Column 6. When this flag is 0, then the spectrum is for a calibration sequence, and the data are brightness temperatures; furthermore, the targets are either sky, cold load or warm load, depending on the value of the Mirror position flag in column 2. However, when the Cal/No-cal flag is 1, then the data are difference spectra between the two LO states, so will be close to zero on average. Only the Cal=1 data (and the Sky data for Cal=0) are the observational data for the target body. (It is unfortunate that Cal=0 means calibration, but this is a historical accident and cannot now be changed.)

See Appendix 3 (Section 7) for a description of an IDL-based tool to read MIRO data that is provided by PDS, called READPDS.

**Frequency calibration:** the total bandwidth of MIRO is 180 MHz, with the frequency going inversely with the bin (channel) number of the CTS spectra, in an approximately linear fashion. The exact dependence is dependent on the temperature, which is why the number of bins are increased from 4096 for the raw data to 4250 for the calibrated data. This is described in the document CTS\_FREQUENCY\_CALIBRATION.PDF in the DOCUMENT directories of the Level-3 archives. This also describes how the true frequencies of the lines observed (which span 33 GHz, far more than the nominal bandwidth) are mapped into the CTS spectrum. Discontinuities between the eight regions of the different mappings appear as smooth transitions, because of the design of the CTS. Data in the transition regions between these bands are not usable.

## 5. Appendix 1: VOLDESC.CAT

PDS\_VERSION\_ID = PDS3  
RECORD\_TYPE = "STREAM"  
RECORD\_BYTES = "UNK"

OBJECT = VOLUME  
VOLUME\_SERIES\_NAME = "ROSETTA SCIENCE ARCHIVE"  
VOLUME\_SET\_NAME = "ROSETTA: MIRO DATA"  
VOLUME\_SET\_ID = "USA\_NASA\_JPL\_ROMIR\_1000"  
VOLUMES = 1  
VOLUME\_NAME = "RAW MIRO DATA FOR THE GROUND PHASE"  
VOLUME\_ID = "ROMIR\_1001"  
VOLUME\_VERSION\_ID = "VERSION 1"  
VOLUME\_FORMAT = "ISO-9660"  
DATA\_SET\_ID = "RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0"  
MEDIUM\_TYPE = "ELECTRONIC"  
PUBLICATION\_DATE = 2006-11-06  
DESCRIPTION = "This volume is the first containing  
Microwave Instrument for the Rosetta Orbiter (MIRO) data. It  
contains data obtained during ground testing at NASA/JPL."

OBJECT = DATA\_PRODUCER  
INSTITUTION\_NAME = "JET PROPULSION LABORATORY"  
FACILITY\_NAME = "MIRO DATA PROCESSING TEAM"  
FULL\_NAME = "SAMUEL GULKIS"  
ADDRESS\_TEXT = "JET PROPULSION LABORATORY \N  
4800 OAK GROVE DRIVE \n  
MAILSTOP 183-301 \n  
PASADENA, CA 91109 \n  
USA"

END\_OBJECT = DATA\_PRODUCER

OBJECT = CATALOG  
^MISSION\_CATALOG = "MISSION.CAT"  
^INSTRUMENT\_HOST\_CATALOG = "INSTHOST.CAT"  
^INSTRUMENT\_CATALOG = "INST.CAT"  
^DATA\_SET\_CATALOG = "DATASET.CAT"  
^REFERENCE\_CATALOG = "REF.CAT"  
^PERSONNEL\_CATALOG = "PERSONNEL.CAT"  
^SOFTWARE\_CATALOG = "SOFTWARE.CAT"  
^TARGET\_CATALOG = "TARGET.CAT"

END\_OBJECT = CATALOG

END\_OBJECT = VOLUME

END

## 6. Appendix 2: Structure Files

### 6.1 Spectrometer Level 2 Data (see section 4.3.1)

Filename: CTS\_LEVEL\_2\_FORMAT.FMT  
Rosetta/miro cts raw data structure

This structure label gives the data structure for the data decommutated from the telemetry for the uncalibrated (raw) data from the MIRO Chirp Transform Spectrometer (CTS).

```
OBJECT    = COLUMN
NAME      = TIME
COLUMN_NUMBER = 1
DATA_TYPE = IEEE_REAL
FORMAT    = F16.5
START_BYTE = 1
BYTES     = 8
DESCRIPTION= "Time of acquisition of the spectrum in elapsed UTC seconds
              after 1-Jan-1970 (see EAICD Section 3.2.2)."
```

```
END_OBJECT = COLUMN
```

```
OBJECT    = COLUMN
NAME      = MIRPOS
COLUMN_NUMBER = 2
DATA_TYPE = MSB_UNSIGNED_INTEGER
FORMAT    = I1
START_BYTE = 9
BYTES     = 1
DESCRIPTION= "Mirror position: 1: sky, 2: cold target, 3: warm target"
```

```
END_OBJECT = COLUMN
```

```
OBJECT    = COLUMN
NAME      = POWERMODE
COLUMN_NUMBER = 3
DATA_TYPE = MSB_UNSIGNED_INTEGER
FORMAT    = I1
START_BYTE = 10
BYTES     = 1
DESCRIPTION= "Values 1-6 as described in MIRO User Manual 6.1.2.1"
```

```
END_OBJECT = COLUMN
```

```
OBJECT    = COLUMN
NAME      = INTEGRATION
COLUMN_NUMBER = 4
DATA_TYPE = MSB_UNSIGNED_INTEGER
FORMAT    = I1
START_BYTE = 11
```

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 32

---

BYTES = 1  
DESCRIPTION= "Values 0-3 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMOOTHING  
COLUMN\_NUMBER = 5  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 12  
BYTES = 1  
DESCRIPTION= "Values 0-3 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CAL  
COLUMN\_NUMBER = 6  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 13  
BYTES = 1  
DESCRIPTION= "0: Calibration in progress, 1: No calibration in progress"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = LO  
COLUMN\_NUMBER = 7  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 14  
BYTES = 1  
DESCRIPTION= "LO designation, 0 or 1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = NUMPLL  
COLUMN\_NUMBER = 8  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I2  
START\_BYTE = 15  
BYTES = 1  
DESCRIPTION= "Number of used pll (phased-lock-loop) bytes"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = PLL\_DATA  
COLUMN\_NUMBER = 9  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = 2411  
START\_BYTE = 16  
BYTES = 24



ITEMS = 24  
ITEM\_BYTES = 1  
DESCRIPTION = "pll (phased-lock-loop) status bytes as described in MIRO User Manual 6.2.3."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ASTEROID  
COLUMN\_NUMBER = 10  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 40  
BYTES = 1  
DESCRIPTION = "Asteroid mode: 0: in asteroid mode, 1: not in asteroid mode, 4 as described In MIRO User Manual 6.1.2.2."  
END\_OBJECT= COLUMN

OBJECT = COLUMN  
NAME = SPECTRAL\_DATA  
COLUMN\_NUMBER = 11  
DATA\_TYPE = MSB\_INTEGER  
FORMAT = 4096I9  
START\_BYTE = 41  
BYTES = 16384  
ITEMS = 4096  
ITEM\_BYTES = 4  
DESCRIPTION = "Uncalibrated brightness temperature as signed integer"  
END\_OBJECT = COLUMN

The following is an example of the first record of a Level-2 Spectroscopic file, with just 4 of the 4250 data fields shown, in both hex and formatted representations:

Listing of rows 1 to 1 for file RO-E-MIRO-2-EAR1-EARTH1-V1.0/DATA/SPECTROSCOPIC/MIRO\_2\_CTS\_20050630809.DAT

```
COL.#:      1          2 3 4 5 6 7 8 9
           10      11
ITEMS: 41D08A0D4F32378B 02 01 00 00 00 00 06 80 80 80 80 80 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00974000 009A8000 0097C000 009B4000

COL.#:      1          2 3 4 5 6 7 8 9
           10      11
ITEMS: 1.109931325E+09 2 1 0 0 0 0 6 128 128 128 128 128 128 0 0 0 0
0 0 0 0 0 0 0 0 0 0 0 0 0 9912320 10125312
9945088 10174464
```

## 6.2 Spectrometer Level 3 Data (see section 4.3.1)

Filename: CTS\_LEVEL\_3\_FORMAT.FMT  
Rosetta/miro cts calibrated data structure

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 34

---

This structure label gives the data structure for the calibrated data from the MIRO Chirp Transform Spectrometer (CTS).

OBJECT = COLUMN  
NAME = TIME  
COLUMN\_NUMBER = 1  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
UNIT = SECOND  
START\_BYTE = 1  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the spectrum in elapsed UTC seconds  
after 1-Jan-1970 (see EAICD Section 3.2.2)."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = UTC  
COLUMN\_NUMBER = 2  
DATA\_TYPE = TIME  
FORMAT = A19  
START\_BYTE = 9  
BYTES = 19  
DESCRIPTION = "Absolute time of acquisition of the spectrum in the UTC system."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MIRPOS  
COLUMN\_NUMBER = 3  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 28  
BYTES = 1  
DESCRIPTION = "Mirror position: 1: sky, 2: cold target, 3: warm target"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POWERMODE  
COLUMN\_NUMBER = 4  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 29  
BYTES = 1  
DESCRIPTION = "Values 1-6 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = INTEGRATION  
COLUMN\_NUMBER = 5  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 30

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 35

---

BYTES = 1  
DESCRIPTION= "Values 1-3 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMOOTHING  
COLUMN\_NUMBER = 6  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 31  
BYTES = 1  
DESCRIPTION= "Values 1-4 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CAL  
COLUMN\_NUMBER = 7  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 32  
BYTES = 1  
DESCRIPTION= "0: Calibration in progress, 1: No calibration in progress"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = LO  
COLUMN\_NUMBER = 8  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 33  
BYTES = 1  
DESCRIPTION= "LO designation, 0 or 1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ASTEROID  
COLUMN\_NUMBER = 9  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 34  
BYTES = 1  
DESCRIPTION = "Asteroid mode: 0: in asteroid mode, 1: not in asteroid mode."  
END\_OBJECT= COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T1  
COLUMN\_NUMBER = 10  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.2  
START\_BYTE = 35  
BYTES = 4

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 36

---

DESCRIPTION = "Engineering temperature of CTS (degrees C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TYPE  
COLUMN\_NUMBER = 11  
DATA\_TYPE = CHARACTER  
FORMAT = A1  
START\_BYTE = 39  
BYTES = 1  
DESCRIPTION = "Type of calibration data used: C = cold, S = sky"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = STATUS  
COLUMN\_NUMBER = 12  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 40  
BYTES = 1  
DESCRIPTION = "Status flag: 0 = nominal, <0 = problematical, >0 = TBD"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = METHOD  
COLUMN\_NUMBER = 13  
DATA\_TYPE = CHARACTER  
FORMAT = A1  
START\_BYTE = 41  
BYTES = 1  
DESCRIPTION = "Method of calibration: A = average, I = interpolate, N = nearest neighbor"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = PLL  
COLUMN\_NUMBER = 14  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I4  
START\_BYTE = 42  
BYTES = 1  
DESCRIPTION = "Logical OR of the PLL bytes in the raw record, indicating phased-lock loop status"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = RA  
COLUMN\_NUMBER = 15  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
UNIT = DEGREE  
START\_BYTE = 43  
BYTES = 4

DESCRIPTION= "Right Ascension of the MIRO boresight"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = DEC  
COLUMN\_NUMBER = 16  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
UNIT = DEGREE  
START\_BYTE = 28  
BYTES = 4  
DESCRIPTION= "Declination of the MIRO boresight"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = VEL  
COLUMN\_NUMBER = 17  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
UNIT = KILOMETER\_PER\_SECOND  
START\_BYTE = 51  
BYTES = 4  
DESCRIPTION= "Relative velocity"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = S0  
COLUMN\_NUMBER = 18  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 55  
BYTES = 4  
DESCRIPTION= "Spare"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = S1  
COLUMN\_NUMBER = 19  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 59  
BYTES = 4  
DESCRIPTION= "Spare"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECTRAL\_DATA  
COLUMN\_NUMBER = 20  
DATA\_TYPE = IEEE\_REAL  
FORMAT = 4250F6.0  
UNIT = KELVIN

START\_BYTE = 63  
BYTES = 17000  
ITEMS = 4250  
ITEM\_BYTES = "Antenna temperatures"  
END\_OBJECT = COLUMN

The following is an example of the first record of a Level-3 Spectroscopic file, with just 4 of the 4250 data fields shown, in both hex and formatted representations:

Listing of rows 1 to 1 for file RO-E-MIRO-3-EAR1-EARTH1-V1.0/DATA/SPECTROSCOPIC/MIRO\_3\_CTS\_20050631015.DAT

```
COL.#:      1          2          3 4 5 6 7 8 9      10 11 12 13 14      15
      16      17      18      19      20
ITEMS: 41D08A0D4F32378B 2005-03-04T10:15:25 02 01 00 00 00 00 00 4287CCCD 53 30 4E 80
00000000 00000000 00000000 00000000 00000000 467EDF40 4685B133 46879D24 468A3874
```

```
COL.#:      1          2          3 4 5 6 7 8 9      10 11 12 13 14
      15      16      17      18      19      20
ITEMS: 1.109931325E+09 2005-03-04T10:15:25 2 1 0 0 0 0 0 6.790E+01 S 48 N
128 0.000E+00 0.000E+00 0.000E+00 0.000E+00 0.000E+00 1.631E+04 1.711E+04 1.736E+04
1.769E+04
```

### 6.3 Continuum Level 2 Data (see section 4.3.2)

Filename: CONT\_LEVEL\_2\_FORMAT.FMT  
Rosetta/MIRO continuum files raw data structure

This structure label gives the data structure for the data decommuted from the telemetry for the uncalibrated (raw) data from the MIRO Millimeter and Submillimeter Continuum Radiometers.

OBJECT = COLUMN  
NAME = TIME  
COLUMN\_NUMBER = 1  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 1  
BYTES = 8  
DESCRIPTION = "Time of start of acquisition of the data in elapsed UTC seconds  
after 1-Jan-1970 (see EAICD Section 3.2.2)."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME1  
COLUMN\_NUMBER = 2  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 9  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the 100th element of the raw data array, if summation=1, or  
of the 50th element if summation=2 or greater; this is zero if summation=0."

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME2  
COLUMN\_NUMBER = 3  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 17  
BYTES = 8

DESCRIPTION = "Time of acquisition of the 100th element of the raw data array, if summation=2 or greater; otherwise zero."

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME3  
COLUMN\_NUMBER = 4  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 25  
BYTES = 8

DESCRIPTION = "Time of acquisition of the 150th element of the raw data array, if summation=2 or greater; otherwise zero."

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MIRPOS  
COLUMN\_NUMBER = 5  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 33  
BYTES = 1

DESCRIPTION = "Mirror position: 1: sky, 2: cold target, 3: warm target"

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POWERMODE  
COLUMN\_NUMBER = 6  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 34  
BYTES = 1

DESCRIPTION = "Values 1-6 as described in MIRO User Manual 6.1.2.1"

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SUMMATION  
COLUMN\_NUMBER = 7  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 35  
BYTES = 1

DESCRIPTION = "Values 0-4 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ND  
COLUMN\_NUMBER = 8  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I3  
START\_BYTE = 36  
BYTES = 1  
DESCRIPTION = "Number of elements in raw data array; should always be 200."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MMSUBTRACTION  
COLUMN\_NUMBER = 9  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = I5  
START\_BYTE = 37  
BYTES = 2  
DESCRIPTION = "Offset in millimeter continuum data, as described in MIRO User Manual 6.2.5."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMMSUBTRACTION  
COLUMN\_NUMBER = 10  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = I5  
START\_BYTE = 39  
BYTES = 2  
DESCRIPTION = "Offset in submillimeter continuum data, as described in MIRO User Manual 6.2.4."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CALMODE  
COLUMN\_NUMBER = 11  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 41  
BYTES = 2  
DESCRIPTION = "0: Calibration in progress, 1: No calibration in progress"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SP  
COLUMN\_NUMBER = 12  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 43  
BYTES = 2  
DESCRIPTION = "Spare, not used"



END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = D  
COLUMN\_NUMBER = 13  
DATA\_TYPE = MSB\_INTEGER  
FORMAT = 20016  
START\_BYTE = 45  
BYTES = 400  
ITEMS = 200  
ITEM\_BYTES = 2  
DESCRIPTION = "Uncalibrated brightness temperature as signed integer"  
END\_OBJECT = COLUMN

The following is an example of the first record of a Level-2 Continuum file, with just the first 4 of the 200 data fields shown, in both hex and formatted representations:

Listing of rows 1 to 1 for file RO-E-MIRO-2-EAR1-EARTH1-V1.0/DATA/CONTINUUM/MIRO\_2\_MM\_20050630809.DAT

```
COL.#:      1          2          3          4          5  6  7  8  9
10 11 12 13
ITEMS: 41D08A0D4F339485 41D08A0D508AF41F 0000000000000000 0000000000000000 02 01 00 C8 0000
0000 0000 0000 1CA9 1CAB 1CAB 1CAA
```

```
COL.#:      1          2          3          4          5  6  7  8
9 10 11 12 13
ITEMS: 1.109931325E+09 1.109931330E+09 0.000000000E+00 0.000000000E+00 2 1 0 200
0 0 0 0 7337 7339 7339 7338
```

#### 6.4 Continuum Level 3 Data (see section 4.3.2)

Filename: CONT\_LEVEL\_3\_FORMAT.FMT  
Rosetta/MIRO continuum files raw data structure

This structure label gives the data structure for the calibrated data from the MIRO Millimeter and Submillimeter Continuum Radiometers.

OBJECT = COLUMN  
NAME = TIME  
COLUMN\_NUMBER = 1  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 1  
BYTES = 8  
DESCRIPTION = "Time of start of acquisition of the data in elapsed UTC seconds  
after 1-Jan-1970 (see EAICD Section 3.2.2)."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME1  
COLUMN\_NUMBER = 2

DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 9  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the 100th element of the raw data array, if summation=1, or of the 50th element if summation=2 or greater; this is zero if summation=0."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME2  
COLUMN\_NUMBER = 3  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 17  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the 100th element of the raw data array, if summation=2 or greater; otherwise zero."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TIME3  
COLUMN\_NUMBER = 4  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 25  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the 150th element of the raw data array, if summation=2 or greater; otherwise zero."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = UTC  
COLUMN\_NUMBER = 5  
DATA\_TYPE = TIME  
FORMAT = A19  
START\_BYTE = 33  
BYTES = 19  
DESCRIPTION = "Absolute time of start of acquisition of the data in the UTC system."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MIRPOS  
COLUMN\_NUMBER = 6  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 52  
BYTES = 1  
DESCRIPTION = "Mirror position: 1: sky, 2: cold target, 3: warm target"  
END\_OBJECT = COLUMN

OBJECT = COLUMN

NAME = POWERMODE  
COLUMN\_NUMBER = 7  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = 11  
START\_BYTE = 53  
BYTES = 1  
DESCRIPTION = "Values 1-6 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SUMMATION  
COLUMN\_NUMBER = 8  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = 11  
START\_BYTE = 54  
BYTES = 1  
DESCRIPTION = "Values 0-4 as described in MIRO User Manual 6.1.2.1"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ND  
COLUMN\_NUMBER = 9  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = 13  
START\_BYTE = 55  
BYTES = 1  
DESCRIPTION = "Number of elements in raw data array; should always be 200."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MMSUBTRACTION  
COLUMN\_NUMBER = 10  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = 15  
START\_BYTE = 56  
BYTES = 2  
DESCRIPTION = "Offset in millimeter continuum data, as described in MIRO User Manual 6.2.5."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMMSUBTRACTION  
COLUMN\_NUMBER = 11  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = 11  
START\_BYTE = 58  
BYTES = 2  
DESCRIPTION = "Offset in submillimeter continuum data, as described in MIRO User Manual 6.2.4."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CALMODE

COLUMN\_NUMBER = 12  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = 11  
START\_BYTE = 60  
BYTES = 2  
DESCRIPTION = "0: Calibration in progress, 1: No calibration in progress"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SP  
COLUMN\_NUMBER = 13  
DATA\_TYPE = UNSIGNED\_INTEGER  
FORMAT = 11  
START\_BYTE = 62  
BYTES = 2  
DESCRIPTION = "Spare, not used"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = D  
COLUMN\_NUMBER = 14  
DATA\_TYPE = IEEE\_REAL  
FORMAT = 200F6.0  
UNIT = KELVIN  
START\_BYTE = 64  
BYTES = 800  
ITEMS = 200  
ITEM\_BYTES = 4  
DESCRIPTION = "Antenna temperatures"  
END\_OBJECT = COLUMN

The following is an example of the first record of a Level-3 Continuum file, with just the first 4 of the 200 data fields shown, in both hex and formatted representations:

Listing of rows 1 to 1 for file RO-E-MIRO-3-EAR1-EARTH1-  
V1.0/DATA/CONTINUUM/MIRO\_3\_MM\_20050631017.DAT

```
COL.#:      1          2          3          4          5
  6  7  8  9 10 11 12 13 14
ITEMS: 41D08A0D6A110EAA 41D08A0D6B6223E2 0000000000000000 0000000000000000 2005-03-
04T10:17:12 01 01 00 C8 0000 0000 0001 0000 412CBA5D 4135BD7F 4135BD7F 413BBF95
```

```
COL.#:      1          2          3          4          5
  6  7  8  9 10 11 12 13 14
ITEMS: 1.109931432E+09 1.109931438E+09 0.000000000E+00 0.000000000E+00 2005-03-
04T10:17:12 1 1 0 200 0 0 1 0 1.080E+01 1.136E+01 1.136E+01 1.173E+01
```

## 6.5 Housekeeping Data (see section 4.3.3)

Filename: ENG\_LEVEL\_2\_FORMAT.FMT  
Rosetta/MIRO engineering raw data structure

This structure label gives the data structure for the data decommutated from the telemetry for the engineering (housekeeping) data from the MIRO instrument.

\*/

OBJECT = COLUMN  
NAME = TIME  
COLUMN\_NUMBER = 1  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F16.5  
START\_BYTE = 1  
BYTES = 8  
DESCRIPTION = "Time of acquisition of the data packet in elapsed UTC  
seconds after 1-Jan-1970 (see EAICD Section 3.2.2)."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T1  
COLUMN\_NUMBER = 2  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 9  
BYTES = 4  
DESCRIPTION = "CTS Temperature sensor #1 Branch A (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T2  
COLUMN\_NUMBER = 3  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 13  
BYTES = 4  
DESCRIPTION = "CTS Temperature sensor #2 Branch A (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T3  
COLUMN\_NUMBER = 4  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 17  
BYTES = 4  
DESCRIPTION = "CTS Temperature sensor #1 Branch B (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T4  
COLUMN\_NUMBER = 5  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 46

---

START\_BYTE = 21  
BYTES = 4  
DESCRIPTION= "CTS Temperature sensor #2 Branch B (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T5  
COLUMN\_NUMBER = 6  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 25  
BYTES = 4  
DESCRIPTION= "CTS Temperature sensor #1 analog tray (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPECT\_T6  
COLUMN\_NUMBER = 7  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 29  
BYTES = 4  
DESCRIPTION= "CTS Temperature sensor #2 analog tray (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = EU\_TEMP  
COLUMN\_NUMBER = 8  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 33  
BYTES = 4  
DESCRIPTION= "Electronics Unit (EU) temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ECAL\_TEMP  
COLUMN\_NUMBER = 9  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.0  
START\_BYTE = 37  
BYTES = 4  
DESCRIPTION= "Reference temperature (634 Ohms) (Digital Units)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_5V\_EU  
COLUMN\_NUMBER = 10  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 41

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 47

---

BYTES = 4  
DESCRIPTION= "EU +5V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_EU  
COLUMN\_NUMBER = 11  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.3  
START\_BYTE = 45  
BYTES = 4  
DESCRIPTION= "EU +12V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = NEG\_12V\_EU  
COLUMN\_NUMBER = 12  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F7.3  
START\_BYTE = 49  
BYTES = 4  
DESCRIPTION= "EU -12V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = 3V\_EU  
COLUMN\_NUMBER = 13  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 53  
BYTES = 4  
DESCRIPTION= "EU +3.3V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_24V\_EU  
COLUMN\_NUMBER = 14  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.3  
START\_BYTE = 57  
BYTES = 4  
DESCRIPTION= "EU +24V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_5V\_ANA\_EU  
COLUMN\_NUMBER = 15  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 61  
BYTES = 4

DESCRIPTION= "EU +5V analog voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_5V\_CURR\_EU  
COLUMN\_NUMBER = 16  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 65  
BYTES = 4  
DESCRIPTION= "EU +5V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_CURR\_EU  
COLUMN\_NUMBER = 17  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 69  
BYTES = 4  
DESCRIPTION= "EU +12V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = NEG\_12V\_CURR\_EU  
COLUMN\_NUMBER = 18  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 73  
BYTES = 4  
DESCRIPTION= "EU -12V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_24V\_ANA\_CURR\_EU  
FORMAT = E11.3  
COLUMN\_NUMBER = 19  
DATA\_TYPE = IEEE\_REAL  
START\_BYTE = 77  
BYTES = 4  
DESCRIPTION= "EU +24V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = 3V\_CURR\_EU  
COLUMN\_NUMBER = 20  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 81  
BYTES = 4  
DESCRIPTION= "EU +3V current monitor (A)"



END\_OBJECT = COLUMN  
  
OBJECT = COLUMN  
NAME = POS\_5V\_ANA\_CURR\_EU  
COLUMN\_NUMBER = 21  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 85  
BYTES = 4  
DESCRIPTION = "EU +5V analog current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TLM\_Heating  
COLUMN\_NUMBER = 22  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 89  
BYTES = 4  
DESCRIPTION = "this item has been removed, see MIRO User Manual 6.2.2.5."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TLM\_RF  
COLUMN\_NUMBER = 23  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 93  
BYTES = 4  
DESCRIPTION = "this item has been removed, see MIRO User Manual 6.2.2.5."  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CTS\_V\_ANA\_1  
COLUMN\_NUMBER = 24  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 97  
BYTES = 4  
DESCRIPTION = "CTS PG1 Voltage (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CTS\_V\_ANA\_2  
FORMAT = F5.3  
COLUMN\_NUMBER = 25  
DATA\_TYPE = IEEE\_REAL  
START\_BYTE = 101  
BYTES = 4  
DESCRIPTION = "CTS PG1 Voltage (V)"  
END\_OBJECT = COLUMN

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 50

---

OBJECT = COLUMN  
NAME = COLD\_LOAD1\_TEMP  
COLUMN\_NUMBER = 26  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.1  
START\_BYTE = 105  
BYTES = 4  
DESCRIPTION = "Cold load temperature #1 (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = COLD\_LOAD2\_TEMP  
COLUMN\_NUMBER = 27  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.1  
START\_BYTE = 109  
BYTES = 4  
DESCRIPTION = "Cold load temperature #2 (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = WARM\_LOAD1\_TEMP  
COLUMN\_NUMBER = 28  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 113  
BYTES = 4  
DESCRIPTION = "Warm load temperature #1 (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = OB\_TEMP  
COLUMN\_NUMBER = 29  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 117  
BYTES = 4  
DESCRIPTION = "Optical Bench temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = TELESCOPE1\_TEMP  
COLUMN\_NUMBER = 30  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.1  
START\_BYTE = 121  
BYTES = 4  
DESCRIPTION = "Telescope #1 temperature (deg C)"  
END\_OBJECT = COLUMN

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 51

---

OBJECT = COLUMN  
NAME = TELESCOPE2\_TEMP  
COLUMN\_NUMBER = 31  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.1  
START\_BYTE = 125  
BYTES = 4  
DESCRIPTION = "Telescope #2 temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = PLL\_TEMP  
COLUMN\_NUMBER = 32  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 129  
BYTES = 4  
DESCRIPTION = "Phase lock loop temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = IFP\_DET\_TEMP  
COLUMN\_NUMBER = 33  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 133  
BYTES = 4  
DESCRIPTION = "smm IF processor detector temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = IFP\_AMP\_TEMP  
FORMAT = F5.1  
COLUMN\_NUMBER = 34  
DATA\_TYPE = IEEE\_REAL  
START\_BYTE = 137  
BYTES = 4  
DESCRIPTION = "smm IF processor amplifier temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_LO\_GUNN  
COLUMN\_NUMBER = 35  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 141  
BYTES = 4  
DESCRIPTION = "smm LO Gunn temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN

NAME = MM\_LO\_GUNN  
COLUMN\_NUMBER = 36  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 145  
BYTES = 4  
DESCRIPTION = "mm LO Gunn temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MOTOR\_TEMP  
COLUMN\_NUMBER = 37  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 149  
BYTES = 4  
DESCRIPTION = "Mirror motor temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SEN\_EL  
COLUMN\_NUMBER = 38  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 153  
BYTES = 4  
DESCRIPTION = "Sensor Electronics Unit (SBEU) temperature (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = WARM\_LOAD2\_TEMP  
COLUMN\_NUMBER = 39  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.1  
START\_BYTE = 157  
BYTES = 4  
DESCRIPTION = "Warm load temperature #2 (deg C)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CAL\_TEMP\_LOW  
COLUMN\_NUMBER = 40  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F3.0  
START\_BYTE = 161  
BYTES = 4  
DESCRIPTION = "Reference temperature 191 Ohms (digital units)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = CAL\_TEMP\_HIGH

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 53

---

COLUMN\_NUMBER = 41  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F4.0  
START\_BYTE = 165  
BYTES = 4  
DESCRIPTION= "Reference temperature 681 Ohms (digital units)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_5V\_SBEU  
COLUMN\_NUMBER = 42  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 169  
BYTES = 4  
DESCRIPTION= "SBEU +5V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_1\_SBEU  
COLUMN\_NUMBER = 43  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.3  
START\_BYTE = 173  
BYTES = 4  
DESCRIPTION= "SBEU +12V voltage monitor #1 (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_2\_SBEU  
COLUMN\_NUMBER = 44  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.3  
START\_BYTE = 177  
BYTES = 4  
DESCRIPTION= "SBEU +12V voltage monitor #2 (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = NEG\_12V\_SBEU  
COLUMN\_NUMBER = 45  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 181  
BYTES = 4  
DESCRIPTION= "SBEU -12V voltage monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_5V\_CURR\_SBEU  
COLUMN\_NUMBER = 46

DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 185  
BYTES = 4  
DESCRIPTION = "SBEU +5V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_CURR\_1\_SBEU  
COLUMN\_NUMBER = 47  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 189  
BYTES = 4  
DESCRIPTION = "SBEU +12V current monitor #1 (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POS\_12V\_CURR\_2\_SBEU  
COLUMN\_NUMBER = 48  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 193  
BYTES = 4  
DESCRIPTION = "SBEU +12V current monitor #2 (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = NEG\_12V\_CURR\_SBEU  
COLUMN\_NUMBER = 49  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 197  
BYTES = 4  
DESCRIPTION = "SBEU -12V current monitor (A)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MM\_GUNN\_CURR  
COLUMN\_NUMBER = 50  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.2  
START\_BYTE = 201  
BYTES = 4  
DESCRIPTION = "mm LO Gunn current (mA)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_Mult\_CURR  
COLUMN\_NUMBER = 51  
DATA\_TYPE = IEEE\_REAL

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 55

---

FORMAT = E11.3  
START\_BYTE = 205  
BYTES = 4  
DESCRIPTION = "smm multiplier current (mA)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_PLL\_ERR  
COLUMN\_NUMBER = 52  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 209  
BYTES = 4  
DESCRIPTION = "static phase error for smm PLL (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = FS1\_ERR  
COLUMN\_NUMBER = 53  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 213  
BYTES = 4  
DESCRIPTION = "Phase error for frequency synthesizer #1 (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = FS2\_ERR  
COLUMN\_NUMBER = 54  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 217  
BYTES = 4  
DESCRIPTION = "Phase error for frequency synthesizer #2 (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = FS3\_ERR  
COLUMN\_NUMBER = 55  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F5.3  
START\_BYTE = 221  
BYTES = 4  
DESCRIPTION = "Phase error for frequency synthesizer #3 (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_PLL\_GUNN\_CURR  
COLUMN\_NUMBER = 56  
DATA\_TYPE = IEEE\_REAL  
FORMAT = F6.2

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 56

---

START\_BYTE = 225  
BYTES = 4  
DESCRIPTION= "smm Gunn oscillator current (via PLL) (mA)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_PLL\_IF\_PWR  
COLUMN\_NUMBER = 57  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 229  
BYTES = 4  
DESCRIPTION= "smm PLL IF power monitor (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SMM\_GDO\_VOLTAGE  
COLUMN\_NUMBER = 58  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 233  
BYTES = 4  
DESCRIPTION= "smm GDO bias voltage (V)"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SPAREF  
COLUMN\_NUMBER = 59  
DATA\_TYPE = IEEE\_REAL  
FORMAT = E11.3  
START\_BYTE = 237  
BYTES = 4  
DESCRIPTION= "spare"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = MIRPOS  
COLUMN\_NUMBER = 60  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 241  
BYTES = 1  
DESCRIPTION= "Mirror position: 1: sky, 2: cold load, 3: warm load"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = POWERMODE  
COLUMN\_NUMBER = 61  
DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = I1  
START\_BYTE = 242



# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 57

---

BYTES = 1  
DESCRIPTION = "Values 1-6 as described in MIRO User Manual 6.1.2.1.5"  
END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SUCR0  
COLUMN\_NUMBER = 62  
DATA\_TYPE = CHARACTER  
FORMAT = A2  
START\_BYTE = 243  
BYTES = 2  
DESCRIPTION = "Low order bits 0-15 of Sensor Unit Control Register"

OBJECT = BIT\_COLUMN  
NAME = HSKMUX  
START\_BIT = 1  
BITS = 5  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z5  
DESCRIPTION = "Selects housekeeping channel"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NON5VSMM  
START\_BIT = 6  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Commands +5V, +/-12V on after -5V is commanded using smm cont mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = IFPCTL0  
START\_BIT = 7  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Bit 0 of 4 bit ifp power control setting"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = IFPCTL1  
START\_BIT = 8  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Bit 1 of 4 bit ifp power control setting"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = MMLNAON

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 58

---

START\_BIT = 9  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Powers on mm LNA bias 0 = on, 1 = off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = SMMLNAON  
START\_BIT = 10  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Powers on smm LNA bias 0 = on, 1 = off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NON5VMM  
START\_BIT = 11  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Commands +5V, +/-12V on after -5V is commanded using mm cont mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NON5VSPC  
START\_BIT = 12  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Commands +5V, +/-12V on after -5V is commanded using cts mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = PLLRESET  
START\_BIT = 13  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Phase-lock reset (0 locks, 1 unlocks) CF User Manual V6.2-7"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = IFPCTL2  
START\_BIT = 14  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Bit 2 of 4 bit ifp power control setting"  
END\_OBJECT = BIT\_COLUMN

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 59

---

OBJECT = BIT\_COLUMN  
NAME = IFPCTL3  
START\_BIT = 15  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Bit 3 of 4 bit ifp power control setting (MSB)"  
END\_OBJECT = BIT\_COLUMN

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = SUCR16  
COLUMN\_NUMBER = 63  
DATA\_TYPE = CHARACTER  
FORMAT = A2  
START\_BYTE = 244  
BYTES = 2  
DESCRIPTION = "High order bits 16-31 of Sensor Unit Control Register"  
END\_OBJECT = COLUMN

OBJECT = BIT\_COLUMN  
NAME = SMMGUNNOSCV  
START\_BIT = 1  
BITS = 4  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z4  
DESCRIPTION = "Setting for voltage to smm Gunn oscillator"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = MMGUNNOSCV  
START\_BIT = 5  
BITS = 4  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z4  
DESCRIPTION = "Setting for voltage to mm Gunn oscillator"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NEG5VSMM  
START\_BIT = 9  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set -5V for smm continuum mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NEG5VMM

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 60

---

START\_BIT = 10  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set -5V for mm continuum mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NEG5VCTS  
START\_BIT = 11  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set -5V for cts mode"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = LDFRQ  
START\_BIT = 12  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set and cleared to load the 3 fequency synthsizer chips"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = MIRROROFF  
START\_BIT = 13  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "0: Mirror power on, 1: Mirror power off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = MIRRORBACK  
START\_BIT = 14  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "1: backward mirror motion, 0: forward mirror motion"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = SMMFRQSW  
START\_BIT = 15  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set LO = 0 or 1 when frequency swtiching is on"  
END\_OBJECT = BIT\_COLUMN

# ROSETTA

To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 61

---

OBJECT = BIT\_COLUMN  
NAME = PINPULLER  
START\_BIT = 16  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Set and cleared to activate mirror pin puller"  
END\_OBJECT = BIT\_COLUMN

END\_OBJECT = COLUMN

OBJECT = COLUMN  
NAME = ADDR100  
COLUMN\_NUMBER = 64  
DATA\_TYPE = CHARACTER  
FORMAT = A2  
START\_BYTE = 246  
BYTES = 2  
DESCRIPTION = "Bits from address 100"

OBJECT = BIT\_COLUMN  
NAME = EMUX  
START\_BIT = 1  
BITS = 5  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z5  
DESCRIPTION = "Bits 0-5 set corresponding EMUX, 0-5"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = SND2SU  
START\_BIT = 6  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Send command register data to Sensor Unit"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = MOTSTEP  
START\_BIT = 7  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Enable motor stepping"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = LDENABLE  
START\_BIT = 8

BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "1: Enable load, 0: Disable load"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = POS12VSPEC  
START\_BIT = 9  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "+12V Spectrometer on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = POS5VSPEC  
START\_BIT = 10  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "+5V Spectrometer on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = POS5VANA  
START\_BIT = 11  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "+5V Analog spectrometer on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = POS3VSPEC  
START\_BIT = 12  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "+3V Spectrometer on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = NEG12VSPEC  
START\_BIT = 13  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "-12V Spectrometer on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 63

---

OBJECT = BIT\_COLUMN  
NAME = USO24V  
START\_BIT = 14  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "+24V USO on, 1: On, 0: Off"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = CALHTRON  
START\_BIT = 15  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "Calibration Heater On, 0: Off, 1: On"  
END\_OBJECT = BIT\_COLUMN

OBJECT = BIT\_COLUMN  
NAME = CTSTRISTORE  
START\_BIT = 16  
BITS = 1  
BIT\_DATA\_TYPE = MSB\_UNSIGNED\_INTEGER  
FORMAT = Z1  
DESCRIPTION = "CTS Tri-state, 1: disable, 0: enable"  
END\_OBJECT = BIT\_COLUMN

END\_OBJECT = COLUMN

The following is an example of the first record of an Engineering file, with just the first 4 of the 58 engineering data fields shown, in both hex and formatted representations:

Listing of rows 1 to 2 for file RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA/ENGINEERING/MIRO\_2\_HSK\_20011410000.DAT

COL.#:	1	2	3	4	5	60	61	62	63	64
ITEMS:	41CD8476E0294984	C19DCEA5	41C03E77	41BF872B	41C042C4	01	06	0000	1004	0000
ITEMS:	41CD8476E5C2F683	41C00553	41C08312	41BFCC30	41C042C4	01	06	001F	1004	0000

Listing of rows 1 to 2 for file RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA/ENGINEERING/MIRO\_2\_HSK\_20011410000.DAT

COL.#:	1	2	3	4	5	60	61	62	63	64
ITEMS:	9.904408963E+08	-1.973E+01	2.403E+01	2.394E+01	2.403E+01	1	6	0	4100	0

## 7. Appendix 3: Available Software to read PDS files

The MIRO data files can be read by PDS-supported software such as NASAVIEW. Currently, the software used by the MIRO team to process the data files is code written by individual team members in IDL. PDS discourages the archiving of software, since it is generally difficult to maintain and port as available hardware evolves. Furthermore, IDL is a proprietary product. A simple Fortran-77 program to read and print out selected parts of the MIRO data files is included in the DOCUMENT directory, named MIRO\_READ\_DATA (see Section 3.4.3.7). It is described in Section 4.4.

It should be emphasised that program MIRO\_READ\_DATA is intended only as supplementary documentation and an example for understanding the structure of MIRO data. A more useful tool for processing MIRO data is an IDL package provided by PDS, named READPDS; for this, see:

<http://pdssbn.astro.umd.edu/nodehtml/software.shtml>

Here is an example of the use of READPDS to ingest a CTS file such as MIRO\_3\_CTS\_20051792320.DAT in the Level-3 Deep-Impact archive.

To start, the following command should be issued:

```
IDL> data = readpds('MIRO_3_CTS_20051792320.LBL')
```

which will read the entire file into an object named "data.table". The structure of this object can then be viewed with the command:

```
IDL> help, /STRUCTURE, data.table
```

which shows that it contains 19 columns, named ".column1" through ".column19", with properties as defined in the .FMT files in this archive. In particular, the spectroscopic data themselves are accessible in the 2-dimensional object data.table.column19[4250,17112]. These can then be processed or plotted using standard IDL commands.

## 8. Appendix 4: Directory Listing of Data Set MIRO\_Thermalvac

```
% ls -R RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0
RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0:
AAREADME.TXT                INDEX
CATALOG                     LABEL
DATA                       RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0.tar.gz
DOCUMENT                   VOLDESC.CAT
ERRATA.TXT
```



**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 65

---

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/CATALOG:

CATINFO.TXT      INST.CAT            MISSION.CAT        REF.CAT            TARGET.CAT  
DATASET.CAT     INSTHOST.CAT       PERSONNEL.CAT      SOFTWARE.CAT

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA:

CONTINUUM        ENGINEERING        SPECTROSCOPIC

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA/CONTINUUM:

MIRO\_MM\_20011410000.DAT      MIRO\_MM\_20011690000.DAT      MIRO\_SUBMM\_20011550000.DAT  
MIRO\_MM\_20011410000.LBL      MIRO\_MM\_20011690000.LBL      MIRO\_SUBMM\_20011550000.LBL  
MIRO\_MM\_20011480000.DAT      MIRO\_MM\_20011760000.DAT      MIRO\_SUBMM\_20011620000.DAT  
MIRO\_MM\_20011480000.LBL      MIRO\_MM\_20011760000.LBL      MIRO\_SUBMM\_20011620000.LBL  
MIRO\_MM\_20011550000.DAT      MIRO\_SUBMM\_20011410000.DAT      MIRO\_SUBMM\_20011690000.DAT  
MIRO\_MM\_20011550000.LBL      MIRO\_SUBMM\_20011410000.LBL      MIRO\_SUBMM\_20011690000.LBL  
MIRO\_MM\_20011620000.DAT      MIRO\_SUBMM\_20011480000.DAT      MIRO\_SUBMM\_20011760000.DAT  
MIRO\_MM\_20011620000.LBL      MIRO\_SUBMM\_20011480000.LBL      MIRO\_SUBMM\_20011760000.LBL

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA/ENGINEERING:

MIRO\_HSK\_20011410000.DAT      MIRO\_HSK\_20011480000.LBL      MIRO\_HSK\_20011620000.DAT      MIRO\_HSK\_20011690000.LBL  
MIRO\_HSK\_20011410000.LBL      MIRO\_HSK\_20011550000.DAT      MIRO\_HSK\_20011620000.LBL      MIRO\_HSK\_20011760000.DAT  
MIRO\_HSK\_20011480000.DAT      MIRO\_HSK\_20011550000.LBL      MIRO\_HSK\_20011690000.DAT      MIRO\_HSK\_20011760000.LBL

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DATA/SPECTROSCOPIC:

MIRO\_CTS\_20011410000.DAT      MIRO\_CTS\_20011480000.LBL      MIRO\_CTS\_20011620000.DAT      MIRO\_CTS\_20011690000.LBL  
MIRO\_CTS\_20011410000.LBL      MIRO\_CTS\_20011550000.DAT      MIRO\_CTS\_20011620000.LBL      MIRO\_CTS\_20011760000.DAT  
MIRO\_CTS\_20011480000.DAT      MIRO\_CTS\_20011550000.LBL      MIRO\_CTS\_20011690000.DAT      MIRO\_CTS\_20011760000.LBL

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/DOCUMENT:

CALIBRATION\_PROC.LBL      MIRO\_LOGBOOK\_18.XLS      MIRO\_TVDATA\_07.LBL      THERMAL\_VAC\_PROC.LBL  
CALIBRATION\_PROC.PDF      MIRO\_LOGBOOK\_19.LBL      MIRO\_TVDATA\_07.ASC      THERMAL\_VAC\_PROC.PDF  
CALIBRATION\_PROC.ASC      MIRO\_LOGBOOK\_19.ASC      MIRO\_TVDATA\_07.XLS      THERMAL\_VAC\_PROC.ASC  
DOCINFO.TXT                MIRO\_LOGBOOK\_19.XLS      RO-MIR-IF-0001\_15.LBL      USER\_MANUAL.LBL  
MIRO\_LOGBOOK\_17.LBL      MIRO\_READ\_DATA.LBL      RO-MIR-IF-0001\_15.PDF      USER\_MANUAL.PDF  
MIRO\_LOGBOOK\_17.ASC      MIRO\_READ\_DATA.ASC      RO-MIR-IF-0001\_15.ASC      USER\_MANUAL.ASC  
MIRO\_LOGBOOK\_17.XLS      MIRO\_TVDATA\_06.LBL      THERMAL\_VAC\_PLAN.LBL      UTCCON.LBL  
MIRO\_LOGBOOK\_18.LBL      MIRO\_TVDATA\_06.ASC      THERMAL\_VAC\_PLAN.PDF      UTCCON.ASC  
MIRO\_LOGBOOK\_18.ASC      MIRO\_TVDATA\_06.XLS      THERMAL\_VAC\_PLAN.ASC

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/INDEX:

INDEX.LBL        INDEX.TAB        INDXINFO.TXT

**ROSETTA**  
To Planetary Science Archive Interface  
Control Document

Document No. : RO-MIR-IF-0001  
Issue/Rev. No. : 1.8  
Date : 2010-11-04  
Page : 66

---

RO-CAL-MIRO-2-GRND-THERMALVAC-V1.0/LABEL:

CONT\_LEVEL\_2\_FORMAT.FMT CTS\_LEVEL\_2\_FORMAT.FMT ENG\_LEVEL\_2\_FORMAT.FMT LABINFO.TXT