R O S E T T A

RPC–MAG SOFTWARE

RO–IGEP–TR–0007

Issue: 2 Revision: 4

April 18, 2007

DDS2PDS

User Manual

Ingo Richter

Institut für Geophysik und extraterrestrische Physik
Technische Universität Braunschweig
Mendelssohnstraße 3, 38106 Braunschweig
Germany

Contents

1 Introduction **1**

2 Usage of *DDS2PDS* **2**

3 S/W–Routines of the *DDS2PDS* package **3**
- 3.1 The *DDS2PDS* shell . . . 3
- 3.2 *DO_PDS* – Initialization of the data processing . . . 3
- 3.3 *RAW2PDS* – Transfer of binary data and conversion to PDS Data . . . 3
- 3.4 *GET_FTP_DATA* . . . 4
- 3.5 Conversion of the binary TM data: *RAW2ASCII* . . . 5
- 3.6 Calibration of the converted data: *GEN_CAL_DATA* . . . 5
- 3.7 *GEN_LEVEL_KL_DATA* – Generation of heater current corrected LEVEL_B data – (*CLK*) . . . 7
- 3.8 *GEN_LEVEL_KL_DATA* – Generation of heater current corrected LEVEL_K data in ECLIPJ2000 coordiantes – (*CLL*) . . . 7
- 3.9 *GEN_LEVEL_EF_DATA* – Generation of averaged and merged LEVEL_A data – (*CLE*) . . . 7
- 3.10 *GEN_LEVEL_FF_DATA* – Generation of averaged and merged LEVEL_B or LEVEL_K data – (*CLF*) . . . 7
- 3.11 *GEN_LEVEL_G_DATA* – Generation of averaged and merged LEVEL_C or LEVEL_L data – (*CLG*) . . . 8
- 3.12 *GEN_LEVEL_H_DATA* – Generation of reaction wheel corrected LEVEL_C or LEVEL_L data – (*CLH*) . . . 8
- 3.13 *GEN_LEVEL_I_DATA* – Generation of averaged and merged LEVEL_H data – (*CLI*) 9
- 3.14 *GEN_LEVEL_J_DATA* – Generation of PCA processed data – (*CLJ*) . . . 9
- 3.15 *GENERATE_PLOTS* – Generation of plots . . . 9
- 3.16 *WRITE_PDS2FTP* – The transfer routine of processed PDS data . . . 10
- 3.17 *SET_QUALITY* – The quality flag application routine . . . 10

4 Output of *DDS2PDS* **11**

5 Directory and Filename Definiton **16**
- 5.1 Software Directories . . . 16
- 5.2 PDS Data Directories . . . 16
- 5.3 Plot Directories . . . 18
- 5.4 Temporary Working Directory . . . 18
- 5.5 Input, Parameter and *RAW2ASCII* Directories . . . 19
- 5.6 Output filenames . . . 19
  - 5.6.1 DATA files . . . 19
  - 5.6.2 PLOT files . . . 21
  - 5.6.3 Logging files . . . 22

6 The command file *PDS.CMD* and the control parameters of *DDS2PDS* **23**
- 6.1 Syntax description . . . 23
- 6.2 Example of a Command File . . . 39

7 File format of *RAW2ASCII* files **41**
7.1 Input files . . . 41
7.2 Output files . . . 41
7.2.1 Housekeeping files . . . 42
7.2.2 Magnetic field files . . . 42

8 File format of PDS files **44**
8.1 Example: A generated PDS label file (**.LBL*) . . . 44
8.2 Example: A generated PDS data file (**.TAB*) . . . 48

9 File format of LaTeXoutput file *PLOTFILES.TEX* **49**

10 Ancillary IDL Routines **51**
10.1 Generation of a Temperature Model . . . 51
10.2 Generation of REACTION WHEEL Plots . . . 54
10.3 Generation of overview plots and overview about available data . . . 56

11 Archive Generation Procedure **57**

1 Introduction

This document describes the data processing S/W *DDS2PDS* which is used for processing and archiving of the ROSETTA RPCMAG data. The S/W has been developed to provide a quasi–automatic data processing chain from the binary magnetic field data on the ESA Data distribution system (DDS) to the data archive at the Imperial College (IC) server which is compliant to the Planetary Data System (PDS) rules.

The DDS delivers binary files with magnetic field raw data of the RPCMAG Inboard (IB) and Outboard (OB) sensor, Sensor temperatures of the IB and OB sensor and additionally RPCMAG Housekeeping (HK) data. The magnetic field data which is delivered as 20 bit ADC two's complement data in instrument coordinates have to be converted in the following way. They have to be rotated into s/c-coordinates, the ground calibration parameters have to be applied, and a temperature correction has to be performed. The result of this procedure will be calibrated data. On a higher level we will rotate these data in a convenient celestial body frame (e.g. EME2000, CSO,..) and average these data to a convenient rate (e.g. 1s mean). The s/w can read Lander heater corrected data and feed them into the standard data processing algorithms. The s/c generated offsets and the structures arising from the s/c noise are NOT removed in these data. The elimination of these effects is under development and will lead to derived data products (TBD)e.g PCA data.

Finally plots can be generated and the data will be written to PDS compliant Label **.LBL* and Table files **.TAB*. These files can automatically be saved on the IGEP ftp–server and will be transferred automatically to the Imperial College Data Server (Pegasus) by the means of a cron job.

The IDL S/W package *DDS2PDS* consists of several routines for different purposes which will be extensively described in this document. The main features of the S/W are:

- Copying TM raw data from the IGEP ftp-server to the local analysis PC
- Converting /Decoding these binary data to ASCII data. This is done by calling the Matlab S/W *RAW2ASCII* from the IDL program.
- Reading attitude and orbit files (*.ROS) from the local geometry directory *ROSETTA/DATA/GEOMETRY/*.
- Calling the ESTEC *OASWLIB* S/W to generate desired attitude and orbit vectors.
- Generating PDS files from these ASCII raw data (Routine: *GEN_CAL_DATA*). Here edited raw data, calibrated data in different levels and averaged data can be produced.

- Generating plots (Routine: *GEN_PLOTS* in the file *PLOT_DAY.PRO*)
- Copying the produced PDS **.TAB* and **.LBL* files to the IGEP ftp–server.
- Generating log–files and distributing them in automatically generated mails.

The package was developed under IDL running on a WINDOWS–XP platform.

2 Usage of *DDS2PDS*

The program has to be started via the batch file *@dds2pds* in the directory */Rosetta/rpcPds/rpcMag/SOFTWARE/PCWIN/IDL*.

The S/W can be executed in two modes:

- Manual Mode: All parameters for the data processing have to be typed in during runtime after being prompted.
- Batch Mode: *DDS2PDS* reads the command file *PDS.CMD* with all needed parameters. This mode is recommended for the standard analysis.

The parameters of the manual mode are all available in the Batch mode. However, the Batch mode has a lot more capabilities. All parameters are described in section 6.

3 S/W–Routines of the *DDS2PDS* package

The following list gives a summary of the complex data transfer, calibration and archiving process. Most of the steps can be controlled by control variables. These variables can be read manually or from the *PDS.CMD* file. Without restriction of generality the following list of routines describes the process with all variables set to the activated status.

3.1 The *DDS2PDS* shell

This shell initializes the global variables, compiles all routines and calls the *DO_PDS* routine finally.

3.2 *DO_PDS* – Initialization of the data processing

1. Initialization of data process control variables.
   This is done either by manual setting or by reading the command file *PDS.CMD*
   One of the most important parameters is the DATE (variable name: `DAY`) of the data to be processed. The software processing is organized in that way, that always data of COMPLETE days will be processed.

2. Inquiry on the Mission Phase to be processed.
   The system has to know the mission phase to set the variables in the *.LBL files to the right values. In former version this had to be done manually, now the mission phase will automatically be identified by the date of the day to be processed.

3. The internal procedure *START_PROCESSING* is called.

   - The conversion process starts by calling *RAW2PDS*
   - If resampled LEVEL_E_DATA ... LEVEL_J_DATA shall be generated, the procedure *GEN_LEVEL_E_DATA* ... *GEN_LEVEL_J_DATA* will be executed.
   - If plots shall be generated, the plot generation routine *GENERATE_PLOTS* will be called.

3.3 *RAW2PDS* – Transfer of binary data and conversion to PDS Data

1. Initialize environment variables for directories and standard filenames.

2. Then the data transfer process starts by calling *GET_FTP_DATA*.

3. If the ASCII data is available on the local computer the calibration procedure *GEN_CAL_DATA* is called.

4. After the successful generation of ASCII data on the local computer these data can be transferred to the IGEP ftp–server by the means of the procedure *WRITE_PDS2FTP*.

3.4 *GET_FTP_DATA*

1. Initialize environment variables for directories and standard filenames. Especially the external batch file names are defined here, as the major part of the data transfer is done by external routines and programs.

2. Delete the

   - input directory for *RAW2ASCII* (rawdir) : D:/rosetta/data/raw_files
   - local directory (localdir): D:/rosetta/data/ftplocal
   - *RAW2ASCII*–Output directory (ascdir) : D:/rosetta/data/asc_files
   - temporary directory (tempdir): D:/rosetta/rpcPds/rpcMag/tmp

3. Generate the script file to get the needed directory listing from the ftp–server (procedure: *gen_dir_scr*)

4. Transfer the directory listing of all available data from the ftp-server (procedure: *get_ftp_dir*)

5. Now this listing has to be filtered and the right files have to be transferred:

   - Select MAGNETIC FIELD data:
     All MAG data filenames of the desired day and the name of the last file of the day before the desired day are filtered out of the list (procedure: *read_mag_dir*). If there are any files, these extracted names will be written to a list (procedure: *gen_mag_copy_file*) and the datafiles of this list will be transferred from the ftp–server to the local machine (procedure: *get_mag_data*) to the *localdir* directory.

6. After this preprocessing all single data files will be glued together. So at the end of this preprocessing there will be one file saved in the *rawdir* directory:

   - One file for the desired day with MAGNETIC FIELD data:
     (*MAGyyyymmdd.ALL*)

7. Now the raw data conversion S/W (*raw2ascii*) is called directly from IDL as a batch process. Input of (*raw2ascii*) is the binary (*MAGyyyymmdd.ALL*) file which contains all HK data and every magnetic field data of the desired day data in every mode and from every sensor. The output of this conversion S/W are separate ASCII files:

one file for every mode and sensor. All output files (extension **.ASC*, ASCII) are written to the (*ascdir*).The exact description of (*raw2ascii*) is given in section 3.5.

8. It turned out that the content of the (*raw2ascii*) outputfile is unsorted. This is due to the flexibility of the RPCMAG instrument, which is able to set either the OB or the IB to the primary sensor. So the outputfiles have to be sorted (this is done by the tool "gawk" in conjunction with "sort"). Additionally double entries have to be removed (achieved with the tool "uniq"). The output files of these additional process have the extension (**.ASS*, ASCII sorted) and can be found in the *assdir* which is set to *D:/rosetta/data/ass_files*

3.5 Conversion of the binary TM data: *RAW2ASCII*

Binary TM data will be read and converted to ASCII by *RAW2ASCII*.

Program details:

- *RAW2ASCII* is developed in MATLAB under Windows by Hans Eichelberger, IWF, GRAZ
- *RAW2ASCII* acts as i/f between the binary raw data transmitted by the DDS or the EGSE or the IC–ftp-server (standard processing) server and the scientific usable data.
- The program converts binary raw data into ASCII data and adds the necessary time information (UTC and s/c-clock) for the subsequent scientific analysis. Bad vectors are marked. All written ASCII files get a header starting with #. The exact file format is described in section 7.
- It reads
  - Magnetic field raw data in all modes (SID1 - SID6)
  - Temperature data (IB/OB)
  - Housekeeping data (HK)
- The program can be executed via a batch job to guarantee a more ore less automatic data generation/conversion process.

3.6 Calibration of the converted data: *GEN_CAL_DATA*

- The converted ASCII data will be merged with auxiliary data (Attitude & Positions) and processed with *GEN_CAL_DATA* to obtain scientific usable data in PDS format.

- This IDL routine acts as I/F between the ASCII raw data converted by *RAW2ASCII* and the PDS System.

- *GEN_CAL_DATA* reads (files can be read from a list for automatic data generation)

  - Magnetic field ASCII raw data:
    RPCMAGyymmddThhmm_RAW<sensor>_<MODE>.ASS
  - Auxiliary data - Attitude:
    ATNR.ROS*
  - Auxiliary data - Position:
    OR.ROS*
  - Housekeeping data:
    RPCMAGyymmddThhmm_RAW_HK.ASS
  - GND Calibration files:
    RPCMAG_GND_CALIB_FSDPU_FM<sensor>.TXT
  - Inflight Calibration files:
    RPCMAG_<id>_CALIB_<sensor>.TXT
    These two files are re-written day by day with the actual field values from the start and the end vector of the actual file.
  - Offset correction files:
    CLA_OFFSETS_<sensor>.TXT
  - Boom alignment file:
    RPCMAG_SC_ALIGN.TXT

- Functions of *GEN_CAL_DATA*:

  1. apply temperature dependent ground calibration results.
  2. apply temperature dependent inflight calibration results to get B-field in unit coordinates.
  3. turn B-field from instrument to s/c coordinates
  4. apply attitude data to get B-field in EME2000 or ECLIPJ2000 frame (or a similar one)
  5. apply filters, spike detectors,.... data processing routines to get "scientific usable" magnetic field data in ASCII time series.

- *GEN_CAL_DATA* writes PDS compliant calibrated data files and labels on different stages (*.TAB, *.LBL).

3.7 *GEN_LEVEL_KL_DATA* – Generation of heater current corrected LEVEL_B data – (*CLK*)

This routine is used to convert external heater corrected data (*.TAB) in LEVEL_B format into LEVEL_K data. The format is the same as the LEVEL_B format. The input data are taken from the `D:\ROSETTA\DATA\HEATER` directory. Output of the routine are **.LBL* and **.TAB* files.

3.8 *GEN_LEVEL_KL_DATA* – Generation of heater current corrected LEVEL_K data in ECLIPJ2000 coordiantes – (*CLL*)

This routine is used to rotate the heater corrected data LEVEL_K data from s/c-coordinates to ECLIPJ2000 coordinates. The format is the same as the LEVEL_C format. As input data LEVEL_K data are taken. Output of the routine are **.LBL* and **.TAB* files.

3.9 *GEN_LEVEL_EF_DATA* – Generation of averaged and merged LEVEL_A data – (*CLE*)

This routine is used to merge data of all modes collected on one day, calculate averaged data from these input files and save it as PDS data. As input the calibrated LEVEL_A data in instrument coordinates are taken. The average period has to be stated by the means of the variable `RESAMPLED_AVERAGE=␣`. Output of the routine are **.LBL* and **.TAB* files.

3.10 *GEN_LEVEL_FF_DATA* – Generation of averaged and merged LEVEL_B or LEVEL_K data – (*CLF*)

This routine is used to merge data of all modes collected on one day, calculate averaged data from this input files and save it as PDS data. As input the LEVEL_B or LEVEL_K data are taken. The average period has to be stated by the means of the variable `RESAMPLED_AVERAGE=␣`. The variable LEVEL_F_SOURCE has to be set. If not stated LEVEL_B will be taken as input. Output of the routine are **.LBL* and **.TAB* files.

3.11 *GEN_LEVEL_G_DATA* – Generation of averaged and merged LEVEL_C or LEVEL_L data – (*CLG*)

This routine is used to merge data of all modes collected on one day, calculate averaged data from this input files and save it as PDS data. As input the LEVEL_C or LEVEL_L data are taken. The average period has to be stated by the means of the variable `RESAMPLED_AVERAGE=␣`. The variable LEVEL_G_SOURCE has to be set. If not stated LEVEL_C will be taken as input.Output of the routine are **.LBL* and **.TAB* files.

3.12 *GEN_LEVEL_H_DATA* – Generation of reaction wheel corrected LEVEL_C or LEVEL_L data – (*CLH*)

It turned out that that rotation frequency (or better: the folded frequency with respect to the actual sampling frequency according the the Nyquist Theorem) of ROSETTA's reaction wheels (RW)can be seen in the magnetic field data. Therefore, a RW-correction algorithm has been developed and implemented to this s/w. The program reads the actual reaction wheel frequency file

(*rwheel_yyyy_month_date.txt*)

containing the time and the frequency of the 4 wheels. These data are used to eliminate the traces of the wheels in the spectra and to generate corrected time series as PDS LEVEL_H data. As input the LEVEL_C or LEVEL_L data are taken.
Needed additional input:

- `RW_FILE=␣` <Reactionwheel filename>
- `SAMPLE_FREQ=␣` <Nominal sample frequency in Hertz>
- The variable LEVEL_H_SOURCE has to be set. If not stated LEVEL_C will be taken as input.

Output of the routine are **.LBL* and **.TAB* files.

3.13 *GEN_LEVEL_I_DATA* – Generation of averaged and merged LEVEL_H data – (*CLI*)

This routine is used to merge data of all modes collected on one day, calculate averaged data from this input files and save it as PDS data. As input the RW–corrected LEVEL_H data are taken. The average period has to be stated by the means of the variable `RESAMPLED_AVERAGE=␣`. Output of the routine are **.LBL* and **.TAB* files.

3.14 *GEN_LEVEL_J_DATA* – Generation of PCA processed data – (*CLJ*)

This routine is used to perform a principal component analysis (PCA) and to generate correlated and uncorrelated time series as PDS compliant LEVEL_J data. As input files OB and IB files have to be present in parallel, as the PCA correlates them. Possible input data are averaged LEVEL_G, and LEVEL_I data. The data source has to be specified using the `PCA_SOURCE=␣` keyword. Additionally the type of used averaged data has to be stated using the filter keyword `FILE_MODE=␣`. E.g `FILE_MODE=␣A16` for processing 16 s averaged data.

Output of the routine are **.LBL* and **.TAB* files. The output file are split in a *CORRELATED* and an *UNCORRELATED* folder. The files in the *CORRELATED* folder have a suffix *_C*, files in the *UNCORRELATED* folder end with *_U*.

3.15 *GENERATE_PLOTS* – Generation of plots

This procedure can be found in the file *PLOT_DAY.PRO* and is used for the automatic plot generation in EPS format. Two general types of plots can be generated:

- Time series plots
- Spectra plots – Power spectra and dynamic spectra

Additionally to the plot generation a LaTeX– shell for every plot is generated by the routine *write_tex*. This routine creates a "figure" environment for every plot (appended to the file *d:/ROSETTA/data/plotfiles.tex*), so that an easy access to the plot files in a LaTeX– document is provided.

3.16 *WRITE_PDS2FTP* – The transfer routine of processed PDS data

This routine transfers all recently processed data files (PDS) to the IGEP ftp–server. On the ftp–server a cron job is running, which transfers all new data files once a day to the RPC data server at the Imperial college in London.

3.17 *SET_QUALITY* – The quality flag application routine

This routine has to be called in the second pass of the data generation process. Invocation is controlled via the keyword `SET_QUAL_FLAGS= Y` . If this routine is activated, the dummy quality flags (xxxxxxxx) of all CALIBRATED, RESAMPLED, and DERIVED data which have been written to the files in the first pass of the data generation process will be substituted by the right ones. The right quality information is read from the QUALITY INDEX FILE which has to be specified by the `QUAL_FILE=` keyword. This ASCII table (*.TXT)is derived from the original EXCEL quality file (*.XLS) by saving the latter one as a MS-DOS formatted text file. The standard index file is `=D:\ROSETTA\DATA\QUALITY\RPCMAG_QUALITY_<missionphase>.xls`. The index file contains the quality assessment for each sensor and each calibration level for all necessary times. From here the right quality flags are copied to the(*.TAB) data files.

4 Output of *DDS2PDS*

DDS2PDS can generate various types of output:

- DATA:
  Data output is PDS/PSA compliant. That means for every written data file (ASCII tables, **.TAB*) a PDS Label file (**.LBL*) will be generated as well. The lines of the label files are automaticalley formatted to 80 chars (done by *DO_FORMAT_LBL_FILES.PRO* to be fully PDS/PSA compliant. Additionally to the usual PDS labels geometric labels related to the s/c position at the START_TIME of each file are generated. This is done with the procedure *ADD_GEOINFO_TO_LBL.PRO*

  Remark: QA denotes Quality Flags. During the data generation dummy values are written into these columns (done by the procedure *ADD_QUALITY_COLUMN_TO_LBL_TAB.PRO*. The real quality flags have to be set in a second path after the data have been assessed.

  The data products are distinguished by processing levels:

  - **EDITED RAW DATA:**
    Data in ADC Counts, Magnetic field in instrument coordinates.

FILE	CONTENT				
HK	UTC	OBT	T_OB	T_IB	
	STAGE_ID_A	STAGE_ID_B	FILTER_CFG		
	MAG_REF_VOLT	MAG_NEG_VOLT	MAG_POS_VOLT		
	BX_OB	BY_OB	BZ_OB		
IB & OB	UTC	OBT	BX	BY	BZ
	T	QUALITY			

– **CALIBRATED DATA:**
DATA in physical units, bad vectors removed

* LEVEL_A Data:
Magnetic field in instrument coordinates.

FILE	CONTENT				
HK	UTC	OBT	T_OB	T_IB	
	STAGE_ID_A	STAGE_ID_B	FILTER_CFG		
	MAG_REF_VOLT	MAG_NEG_VOLT	MAG_POS_VOLT		
	BX_OB	BY_OB	BZ_OB		
IB & OB	UTC	OBT			
	BX	BY	BZ	T	QA

* LEVEL_B Data:
Magnetic field in instrument s/c – coordinates.

FILE	CONTENT				
IB & OB	UTC	OBT			
	BX	BY	BZ	T	QA

* LEVEL_C Data:
Magnetic field in instrument celestial coordinates.

FILE	CONTENT				
IB & OB	UTC	OBT	POS_X	POS_Y	POS_Z
	BX	BY	BZ	QA	

– **RESAMPLED DATA:**

* LEVEL_K Data:
Magnetic field in instrument s/c – coordinates. Influence of Lander Heater current is corrected

FILE	CONTENT				
IB & OB	UTC	OBT			
	BX	BY	BZ	T	QA

* LEVEL_L Data:
  Magnetic field in instrument celestial coordinates. Influence of Lander Heater current is corrected

FILE	CONTENT
IB & OB	UTC OBT POS_X POS_Y POS_Z BX BY BZ QA

* LEVEL_E Data:
  DATA in physical units, bad vectors removed, data ground calibrated, resampled and averaged to the specified time interval. Source is LEVEL_A data.
  Magnetic field in instrument coordinates.

FILE	CONTENT
IB & OB	UTC OBT BX BY BZ T QA

* LEVEL_F Data:
  DATA in physical units, bad vectors removed, data ground calibrated, resampled and averaged to the specified time interval. Source is LEVEL_B or LEVEL_K data.
  Magnetic field in s/c-coordinates.

FILE	CONTENT
IB & OB	UTC OBT BX BY BZ T QA

* LEVEL_G Data:
  DATA in physical units, bad vectors removed, data ground calibrated, resampled and averaged to the specified time interval. Source is LEVEL_C or LEVEL_L data.
  Magnetic field in celestial coordinates.

FILE	CONTENT				
IB & OB	UTC	OBT	POS_X	POS_Y	POS_Z
	BX	BY	BZ	QA	

* LEVEL_H Data:
  Reaction wheel corrected Magnetic field in celestial coordinates.
  Source is LEVEL_C or LEVEL_L data.

FILE	CONTENT				
IB & OB	UTC	OBT	POS_X	POS_Y	POS_Z
	BX	BY	BZ	QA	

* LEVEL_I Data:
  Averaged, reaction wheel corrected Magnetic field in celestial coordinates.

FILE	CONTENT				
IB & OB	UTC	OBT	POS_X	POS_Y	POS_Z
	BX	BY	BZ	QA	

– **DERIVED DATA:**

* LEVEL_J Data:
  PCA processed data in celestial coordinates.
  Output is one file for the correlated part of the data and two files (IB, OB) cotaining the uncorrelated "noise" of the original data.

FILE	CONTENT				
_C & _U (IB,OB)	UTC	OBT	POS_X	POS_Y	POS_Z
	BX	BY	BZ	QA	

- OFFSET FILES:
  The S/W actualizes the two overall offset files
  `D:\ROSETTA\rpcPds\rpcMag\CALIB\CLA_OFFSET_OB.TXT␣`
  `D:\ROSETTA\rpcPds\rpcMag\CALIB\CLA_OFFSET_IB.TXT␣`
  These files contain entries for the first and the last vector of a *.TAB file.
  Format:
  `Time Bx_GND By_GND Bz_GND Bx_FL By_FL Bz_FL OFF_X OFF_y OFF_z T`
  Time is given as UTC string (yyyy-mm-ddThh:mm:ss), fields in nanotesla and the temperature in Kelvin. Index GND means, that the value is obtained from the Ground Calibration ONLY, index FL assigns the field values after application of the proper inflight calibration. Offset assigns the values which have to be added to the data obtained by the pure inflight calibration to ensure that the first vector of a file fits to the last vector of the previous file.

- PLOTS:
  For details refer to section 5.6.2.

- LOGGING FILES:
  Each run of *DDS2PDS* is documented in a logging file named */ROSETTA/DATA/LOG.TXT*

- AUTOMATIC MAILS:
  The entries of the logging files will be automatically transmitted via mail. The sender and receiver parameters can be specified in the last rows of the *do_pds.pro* file.

- LaTeX FIGURE FILES:
  For an easy documentation in LaTeX an automatic generation of figure environments is provided by the *DDS2PDS* s/w. At the first run of *DDS2PDS* the */ROSETTA/DATA/PLOTFILES.TEX* will be generated. For each generated plot a figure environment with caption and labels will be created and written to the file. For each further run of the s/w the file is appended with the new figure blocks.
  Example:

```
\def\fileA{\special{psfile=D:/Rosetta/rpcPds/rpcMag/work/PLOTS/CALIBRATED/2004/MAY
    /SPECTRA/LEVEL_B/IB/RPCMAG040510T0047_CLB_IB_M3_DS1_10000_002.EPS
    vscale = 80 hscale = 80 angle=0 }}
\begin{figure}[h]
   \begin{center}
   \setlength{\unitlength}{1cm}
   \begin{picture}(15.0,21)(0,0)
   \put(-1.0,0.0){ \fileA }
   \put( -1.00, 1.00){\framebox(17.0,21){}}
   \end{picture}
   \caption{File: RPCMAG040510T0047\_CLB\_IB\_M3\_DS1\_10000\_002}
   \label{RPCMAG040510T0047_CLB_IB_M3_DS1_10000_002}
   \end{center}
\end{figure}
\clearpage
```

5 Directory and Filename Definiton

The root directory of the PDS system and the software is */ROSETTA/rpsPds/rpcMag/*

5.1 Software Directories

The software package can be found under *../SOFTWARE/PCWIN/*. Here are 4 subdirectories

- *BAT* contains all the batch files for data transfer and conversion.
- *FOR* contains the FORTRAN files from ESA's *OASWLIB* Library to calculate orbit and attitude vectors.
- *IDL* contains all IDL routines.
- *Matlab* contains everything needed for the *Raw2ASCII* conversion

5.2 PDS Data Directories

To avoid any confusion the file names and directories of the output file are generated automatically. The nomenclature follows the PDS rules and the results/definitions of the RPC team meeting in February 2004 and the RPC Archiving Guidelines RO-IGEP-TR00016.

The converted data is stored in the *./DATA* directory under the actual base directory.The actual base directory name is directly derived from the DATA_SET_ID and varies for each data product with the mission phase and the product level. This data folder contains different subdirectories sorted primarily by data processing level. Thus there are the

- *EDITED*
- *CALIBRATED*
- *RESAMPLED*
- *DERIVED*

Each of these directories contains low level directories sorted by YEAR (yyyy) and MONTH (JAN, FEB, ..., DEC). Below this directory layer the structure varies:

- In the *EDITED* directory there are only 3 data directories for Housekeeping *HK* data, Inboard *IB* and outboard *OB* sensor magnetic field data.
- In the *CALIBRATED* directory an additional distinction is made between different levels:
  - *LEVEL_A*: Calibrated *HK*, *IB*, and *OB* data in instrument coordinates.
  - *LEVEL_B*: Calibrated *IB*, and *OB* data in s/c–coordinates.
  - *LEVEL_C*: Calibrated *IB*, and *OB* data celestial coordinates.
- The *RESAMPLED* directory contains
  - *LEVEL_K*:
    Calibrated *IB*, and *OB* data in s/c–coordinates. Heater current influence eliminated.
  - *LEVEL_L*:
    Calibrated *IB*, and *OB* data celestial coordinates.Heater current influence eliminated.
  - *LEVEL_E*
    IB, and *OB* data, which are glued and averaged raw (ADC) data for a complete day.
  - *LEVEL_F*
    IB, and *OB* data, which are glued and averaged s/c–coordinate data for a complete day.
  - *LEVEL_G*
    IB, and *OB* data, which are glued and averaged celestial coordinate data for a complete day.
  - *LEVEL_H*
    IB, and *OB* data, which are reaction wheel corrected data in celestial coordinates for a complete day.
  - *LEVEL_I*
    IB, and *OB* data, which are glued and averaged LEVEL_H data in celestial coordinates for a complete day.

- The *DERIVED* directory contains up to now

  – *LEVEL_J*
  _C correlated data, which are PCA processed,averaged averaged LEVEL_G or LEVEL_I data in celestial coordinates for a complete day.

  _U uncorrelated data (demerged from *IB*, and *OB* data), which are PCA processed, averaged LEVEL_G or LEVEL_I data in celestial coordinates for a complete day.

5.3 Plot Directories

The *./PLOTS* directory has exactly the same structure as the *./DATA* directory. As the plots will not be part of the PSA/PDS archive the are just stored locally directly under the *rpcpds/rpmag/* directory. Add–Ons:

- there is an additional *HK_B* directory under *LEVEL_A* containing Magnetic field data from the Housekeeping ADC.

- under the *CALIBRATED* directory there is a *LEVEL_D* folder containing plots for the comparison between the IB and the OB sensor.
  The *DIF* directory contains plots of the differences between the IB and the OB sensor. The *XXYYZZ*directory contains plots where the i-th component of the IB is plotted versus the i-th component of the OB sensor.

- under the *CALIBRATED*, *RESAMPLED* and *DERIVED* directory there is also a *SPECTRA* folder containing spectrum plots.
  This directory contains the usual substructure of *LEVEL_n* folder with separate *IB* and *OB* directories.

5.4 Temporary Working Directory

The system needs a temporary directory, where the script file, temporary batch files, and temporary data are stored. This directory is located at *d:/ROSETTA/rpcPds/RpcMag/TMP*

5.5 Input, Parameter and *RAW2ASCII* Directories

All auxiliary files like

- the *RAW2ASCII* input, output and parameter files,
- the control file *PDS.CMD*,
- the Reaction wheel data files,
- the heater corrected input files in LEVEL_B format
- and the logfiles

are located in the *d:/ROSETTA/data* directory and its subdirectories.

5.6 Output filenames

5.6.1 DATA files

The filenames obey the PDS 27.3 standard.

Definition for original sampled and reaction wheel corrected data:

- Magnetic field data:
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_M{mode}.{extension}
- Hosekeeping data:
  RPCMAG{yymmdd}T{hhmm}_{level}_HK.{extension}

yymmdd	YEAR, Month, Day: in two digits format
hhmm	Hour, Minute: in two digits format
level	RAW, CLA, CLB, CLC, CLH ,CLK, CLL,for EDITED, LEVEL_A, LEVEL_B, LEVEL_C, LEVEL_H, LEVEL_K, LEVEL_L
mode	1 . . . 6 for SID1 . . . SID6
sensor	OB, IB
extension	LBL for LABEL files, TAB for TABLE files

Definition for averaged data:

- Magnetic field data:
  RPCMAG{yymmdd}_{level}_{sensor}_A{avg}.{extension}

yymmdd	YEAR, Month, Day: in two digits format
level	CLE,CLF,CLG,CLI for LEVEL_E, LEVEL_F, LEVEL_G, LEVEL_I
avg	average period in seconds
sensor	OB, IB
extension	LBL for LABEL files, TAB for TABLE files

Definition for PCA processed data:

- CORRELATED Magnetic field data:
  RPCMAG{yymmdd}_{level}_A{avg}_C.{extension}

yymmdd	YEAR, Month, Day: in two digits format
level	CLJ for LEVEL_J
avg	average period in seconds
extension	LBL for LABEL files, TAB for TABLE files

- UNCORRELATED Magnetic field data:
  RPCMAG{yymmdd}_{level}_{sensor}_A{avg}_U.{extension}

yymmdd	YEAR, Month, Day: in two digits format
level	CLJ for LEVEL_J
sensor	OB, IB
avg	average period in seconds
extension	LBL for LABEL files, TAB for TABLE files

5.6.2 PLOT files

Definition:

The name of the plot files is directly derived from the data file name. Thus the beginning of the file names is identical up to the {mode} respective {HK}item. Behind these characters the structure differs:

- *HK* and *HK_B* plots
  RPCMAG{yymmdd}T{hhmm}_{level}_HK_P{start}_{end}.EPS
- *OB* and *IB* plots
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_M{mode}_T{start}_{end}_{cal_id}.EPS
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_A{avg}_T{start}_{end}_{cal_id}.EPS
- *DIFF* plots
  RPCMAG{yymmdd}T{hhmm}_{level}_M{mode}_DIF_P{start}_{end}_{cal_id}.EPS
- *XXYYZZ* plots
  RPCMAG{yymmdd}T{hhmm}_{level}_M{mode}_XXYYZZ_P{start}_{end}_{cal_id}.EPS
- *SPECTRA* plots
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_M{mode}_DS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_M{mode}_PS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_A{avg}_DS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}T{hhmm}_{level}_{sensor}_A{avg}_PS{freq_start}_{freq_end}_{cal_id}.EPS
- PCA processed plots
  RPCMAG{yymmdd}_{level}_A{avg}_C_T{start}_{end}_{cal_id}.EPS
  RPCMAG{yymmdd}_{level}_{sensor}_A{avg}_U_T{start}_{end}_{cal_id}.EPS
- PCA processed SPECTRA plots
  RPCMAG{yymmdd}_{level}_A{avg}_C_DS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}_{level}_A{avg}_C_PS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}_{level}_{sensor}_A{avg}_U_DS{freq_start}_{freq_end}_{cal_id}.EPS
  RPCMAG{yymmdd}_{level}_{sensor}_A{avg}_U_PS{freq_start}_{freq_end}_{cal_id}.EPS

Nomenclature:

yymmdd	YEAR, Month, Day: in two digits format
hhmm	Hour, Minute: in two digits format
level	CLA,CLB, CLC,CLE, CLF, CLG,CLH,CLI,CLJ for LEVEL_A, LEVEL_B, LEVEL_C, LEVEL_E, LEVEL_F, LEVEL_G, LEVEL_H, LEVEL_I, LEVEL_J
mode	1 . . . 6 for SID1 . . . SID6
avg	average period in seconds
sensor	OB, IB
P	means PLOT intervall
T	means TIME series plot
DIF	means DIFFERENCE plot
XXYYZZ	Means Plot of OB and IB components (x_i^{OB} vs. x_i^{IB})
DS	means DYNAMIC spectrum
PS	means POWER spectrum
start	Start time of the plot in hhmm–format
end	End time of the plot in hhmm-format
freq_start	Start frequency of the plot in mHz
freq_end	End frequency of the plot mHz
cal_id	Version of the calibration files
C	Correlated part of CLJ files
U	Unorrelated part of CLJ files

5.6.3 Logging files

A logging file of a session is written to *D:/ROSETTA/DATA/LOG.TXT*. It contains information about the generated files and error messages.

6 The command file *PDS.CMD* and the control parameters of *DDS2PDS*

The *DDS2PDS* S/W can be completely controlled by the means of the command file *PDS.CMD* which has to be located at *d:/ROSETTA/data*. The command file consists of a list of commands which are arranged in command blocks. The file can contain any number of command blocks which are used for a specific tasks, e.g. processing the data of a certain day or just plot data of a specific day. Each block begins with a `START:` command and is terminated by an `END:` command. A block is used to process the data a of single day defined by the keyword `DAY=␣` The order of keywords within a block is arbitrarily, except for the `ACTION:` keyword as this will trigger the execution of the data processing.

The file can contain comment lines, starting with a `#`, which will be ignored. Additionally every line will be ignored which does not begin with a defined command keyword.
IF a command keyword is stated, it HAS TO HAVE A VALID ARGUMENT!!

6.1 Syntax description

Here is the complete command list including a command description:

- `#␣`
  Optional entry!
  This character assigns a comment line.

- `ACTION:`
  Necessary Keyword!
  When the parser detects this keyword, the data processing will be started.

- `BOOM=␣`
  Optional Keyword!
  Valid values:

  - `STOWED`
  - `DEPLOYED`
  - any text...

  This keyword tells the system the status of the boom.
  For data before 2004-03-19T03:35 it HAS to be `STOWED` , after 2004-03-17T03:50 it has to be `DEPLOYED`.
  For the boom deployment phase a text like "boom deployment ongoing" can be used.
  If the keyword is not used the default value (`DEPLOYED`) will be used.

- `CAL_DATA=␣`
  Necessary Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword controls the calibration and PDS file generation process. If enabled, the sorted **.ASS* files will be read, ground calibration results will be applied and PDS files will be generated.

- `CAL_FILE_ID=␣`
  Necessary Keyword!
  Valid values:
  - `GND` (for the usage of the ground calibration results only & for generation of a new TEMP_MODEL !)
  - <anything>_nnn (STRING + three digit number 001,002,...)
  - `yyyy-mm-dd_nnn`
  - `yyyy-mm_nnn`

  The ground calibration files (designator: GND) will automatically be used for generation of the offset–temperature models. For normal use the actual inflight calibration files
  RPCMAG_<CAL_FILE_ID>_CALIB_OB.TXT and
  RPCMAG_<CAL_FILE_ID>_CALIB_IB.TXT
  will be used. They describe a 4th order polynomial temperature model for temperature dependent offset reduction of the magnetic field data. The `nnn` number (MANDATORY!) of the `CAL_FILE_ID=␣` will be used as part of the output plot name for an easy distinction of the plot files.

- `DAY=␣`
  Necessary Keyword!
  Format: yyyy–mm–dd
  This keyword specifies the day to be analyzed.

- `DEL=␣`
  Optional Keyword!
  Format: filename to be deleted. Multiple wildcards allowed.

  Using this keyword (multiple entries possible) files can be deleted. This is useful, if in the automatic generation process some files were produced which are not of interest. E.g. after the processing of the data from the 7th of May 2004 in all modes it might be possible that there are only a few vectors in the mode M1 IB files which shall not be archived. They will be deleted using `DEL=␣*040507*IB_M1*`. The routine

deletes only files in the working directory *maindir =D:/rosetta/rpcdps/rpcmag/work* and its subdirectories. Preferably the `DEL=␣` command should be located behind the `ACTION:` command, so that the just generated files can be deleted and do not consume any space on the disk anymore.

- `DYNSPEC_WIN_WIDTH=␣`
  Mandatory, if `GEN_DYNSPEC_PLOTS=␣Y`
  Valid values:
  - Integer number 1 . . . 16, default is 7.

  The window width is used for the calculation of dynamic spectra. The higher this value, the sharpener is the frequency resolution. However, with increasing windows the time resolution decreases.
  The default window width is 7, hence $2^7 = 128$.

- `END:`
  Necessary Keyword!
  This keyword terminates a block and separates it from other ones.

- `FILE=␣`
  Optional Keyword!
  Valid values:
  - Complete path of a low level command file, e.g. *D:/Rosetta/data/test.cmd*

  This keyword can be used to maintain a high level structure in the command file. If this keyword is used, the command parser will execute the commands in the stated sub command file (here: *test.cmd*). No other keywords should be used in the high level *PDS.CMD* file if `FILE=␣` is used. As the usage of `FILE=␣` will lead to a recursive process, the `FILE=␣` keyword should not be used in the low level command files!

- `FILE_MODE=␣`
  Optional Keyword!
  Valid values:
  - `M1`
  - `M2`
  - `M3`
  - `M4`
  - `M5`
  - `M6`
  - `OB`
  - `IB`

For a higher state of filtering the value can be extended to a combined sensor_mode filter or an average selector like e.g

- `OB_M1`
- `IB_M3`
- `A16`
- ...

This keyword acts as a filter. If specified, only data of the stated mode will be processed (Input File Path Filter).
If keyword is omitted, all data will be processed. Especially for generating PCA processed LEVEL_J data the average interval like `FILE_MODE=␣A1` for 1s avg data has to be stated.

- `FILE_SELECT=␣`
  Optional Keyword!
  Valid values:
  - `D:\ROSETTA\rpcPDS\rpcMag\work\data\....`
  - `D:\ROSETTA\rpcPDS\rpcMag\work\data\RPCMAG*050302*CLA*OB*`
  - `...`

  This keyword acts as a filter. If specified, only data files matching the stated expression will be processed.
  This keyword acts on the highest filter level and will override the `FILE_MODE=␣` in the first filter step and the automatic selection if `FILE_SELECT=␣` contains more then 4 characters. In this case `FILE_MODE=␣` is NOT taken into account. So use this keyword with care! If used, the complete path down to root level should be named. If used, also the keywords `INSTRUMENT=␣` and `FILE_MODE=␣` should be set to guarantee a successful filtering.

- `FILE_TIME_END=␣`
  Optional Keyword!
  Format: hh:mm:ss
  If this keyword is present, only data before the given time will be processed. Otherwise (default) all data are taken into account.

- `FILE_TIME_START=␣`
  Optional Keyword!
  Format: hh:mm:ss
  If this keyword is present, only data after the given time will be processed. Otherwise (default) all data are taken into account.

- `GEN_DYNSPEC_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  Using this keyword the generation of dynamic spectra plots is enabled. In this case further keywords as `SPEC_SOURCE=␣`, `PLOT_FREQ_START=␣`, `PLOT_FREQ_END=␣`, `PLOT_AMP_MIN=␣`, and `PLOT_AMP_MAX=␣` have to be set (see below). With these keywords detailed plot parameters can be adjusted.

- `GEN_LEV_A_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled HK, IB and OB plots of the CALIBRATED LEVEL_A data will be generated.

- `GEN_LEV_B_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled IB and OB plots of the CALIBRATED LEVEL_B data will be generated.

- `GEN_LEV_C_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled IB and OB plots of the CALIBRATED LEVEL_C data will be generated.

- `GEN_LEV_D_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled difference plots of IB and OB (DIFF) and layer plots (XXYYZZ) plots of the CALIBRATED LEVEL_B data will be generated.

- `GEN_LEV_E_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of averaged data. As input the EDITED RAW PDS data has to be available. All files (all different modes) of the stated day will be glued together and averaged PDS data will be generated. The average period has to be assigned by the `RESAMPLED_AVERAGE=␣` keyword.

- `GEN_LEV_E_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the merged and averaged LEVEL_E data will be generated. This is useful especially for the commissioning phase where lots of mode changes happened during one session.

- `GEN_LEV_F_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of averaged data. As input the LEVEL_B or LEVEL_K PDS data has to be available. All files (all different modes) of the stated day will be glued together and averaged PDS data will be generated. The average period has to be assigned by the `RESAMPLED_AVERAGE=␣` keyword. The data source is selected via the `LEVEL_F_SOURCE=␣` keyword.

- `GEN_LEV_F_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the merged and averaged LEVEL_F data will be generated. This is useful especially for the commissioning phase where lots of mode changes happened during one session.

- `GEN_LEV_G_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of averaged data. As input the LEVEL_C or LEVEL_L PDS data has to be available. All files (all different modes) of the stated day will be glued together and averaged PDS data will be generated. The average period has to be assigned by the `RESAMPLED_AVERAGE=␣` keyword. The data source is selected via the `LEVEL_G_SOURCE=␣` keyword.

- `GEN_LEV_G_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the merged and averaged LEVEL_G data will be generated. This is useful especially for the commissioning phase where lots of mode changes happened during one session.

- `GEN_LEV_H_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of reaction wheel corrected data. As input the LEVEL_C or LEVEL_L PDS data has to be available. Only one mode and sensor can be handled within one START/END block. Additional the nominal sample frequency `SAMPLE_FREQ=␣` the RW file name `RW_FILE=␣` and the extended file mode (e.g. 'OB_M3' or 'IB_M2' etc.) keyword `FILE_MODE=␣` has to be defined. The data source is selected via the `LEVEL_H_SOURCE=␣` keyword.

- `GEN_LEV_H_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the RW corrected LEVEL_H data will be generated.

- `GEN_LEV_I_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of averaged data. As input the LEVEL_H PDS data has to be available. All files (all different modes) of the stated day will be glued together and averaged PDS data will be generated. The average period has to be assigned by the `RESAMPLED_AVERAGE=␣` keyword.

- `GEN_LEV_I_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the merged and averaged LEVEL_I data will be generated.

- `GEN_LEV_K_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No, DEFAULT)
  - `Y` (for Yes)

  This keyword allows the generation heater influence corrected data in s/c-coordinates. As input the LEVEL_B (*.TAB) data in the `D:\ROSETTA\DATA\HEATER` directory has to be available.

- `GEN_LEV_K_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the heater current corrected LEVEL_K data will be generated.

- `GEN_LEV_L_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No, DEFAULT)
  - `Y` (for Yes)

  This keyword allows the generation heater influence corrected data in ECLIPJ2000 coordinates. As input the LEVEL_K data has to be available.

- `GEN_LEV_L_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plot from the heater current corrected LEVEL_L data will be generated.

- `GEN_LEV_J_DATA=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword allows the generation of PCA processed data. As input the LEVEL_G or LEVEL_I PDS data has to be available. PDS data will be generated. The average period has to be assigned by the `FILE_MODE=An␣` keyword where n denotes the seconds of the average interval. It is mandatory to state the source of the averaged data with the keyword `PCA_SOURCE=LEVEL_G␣` or `PCA_SOURCE=LEVEL_I␣`

- `GEN_LEV_J_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled a plots from the PCA processed LEVEL_J data will be generated.

- `GEN_PLOTS=␣`
  Optional Keyword! Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword controls the automatic plot generation. If enabled the overall plot routine access is activated and EPS files can be produced. The kinds of plots to be produced have to be specified by further keywords (see below). If disabled no plots are generated.

- `GEN_POW_SPEC_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  Using this keyword the generation of Power spectra plots is enabled. In this case further keywords as `SPEC_SOURCE=␣`, `PLOT_FREQ_START=␣`, `PLOT_FREQ_END=␣`, `PLOT_AMP_MIN=␣`, and `PLOT_AMP_MAX=␣` have to be set (see below). With these keywords detailed plot parameters can be adjusted.

- `GEN_RAW_PLOTS=␣`
  Optional Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled HK, IB and OB plots of the EDITED data will be generated.

- `GEN_TEMP_MODEL=␣`
  Optional keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  If enabled the files needed for the evaluation of the offset–temperature model will be created. This means that the data will be generated using the ground calibration result files
  RPCMAG_GND_CALIB_FSDPU_FMOB.TXT
  RPCMAG_GND_CALIB_FSDPU_FMIB.TXT
  By the means of the keyword `CAL_DATA=␣` it has to be stated whether the needed LEVEL_A files in instrument coordinates shall be produced. This should be done if not already done. As a last step the LEVEL_E_DATA will be generated from the LEVEL_A_DATA using the average period stated by the `RESAMPLED_AVERAGE=␣` keyword. 200 s should be used for this parameter. At the end the LEVEL_A and LEVEL_E data are available in the *D:/ROSETTA/DATA/CALIB/TEMPMODEL_AVG* directory, where they are expected by the modelling s/w *CALIB_ROS_TEMP_XXXX.PRO* (refer to section10.1)
  In case of generating a TEMP_MODEL the CAL_FILE_ID has to be set to GND!

- `GET_DATA=␣`
  Necessary Keyword!
  Valid values:
  - `N` (for No)
  - `Y` (for Yes)

  This keyword controls the data transfer from the IGEP ftp–server to the local machine. If enabled the data will be ftped to the local machine and *RAW2ASCII* will generate ASCII raw files. If disabled the sorted ASCII raw files have already to be available in the *D:/ROSETTA/DATA/ASS_FILES* directory.

- `INSTRUMENT=␣`
  Optional Keyword!
  Valid values:
  - `RPCMAG`
  - `ROMAP`

  This keyword specifies the instrument whose is data will be analyzed. If not stated, RPCMAG will be used as default.

- `LEVEL_F_SOURCE=␣`
  Mandatory, if `GEN_LEV_F_DATA=␣Y`
  Valid values:
  - `LEVEL_B`, Default
  - `LEVEL_K`

  This keyword specifies which data are used for the generation of LEVEL_F data.

- `LEVEL_G_SOURCE=␣`
  Mandatory, if `GEN_LEV_G_DATA=␣Y`
  Valid values:
  - `LEVEL_C`, Default
  - `LEVEL_L`

  This keyword specifies which data are used for the generation of LEVEL_G data.

- `LEVEL_H_SOURCE=␣`
  Mandatory, if `GEN_LEV_H_DATA=␣Y`
  Valid values:
  - `LEVEL_C`, Default
  - `LEVEL_L`

  This keyword specifies which data are used for the generation of LEVEL_H data.

- `PCA_SOURCE=␣`
  Mandatory, if `GEN_LEV_J_DATA=␣Y`
  Valid values:
  - `LEVEL_G`
  - `LEVEL_I`

  This keyword specifies which data are used for the PCA.

- `PLOT_AMP_MAX=␣`
  Mandatory, if `GEN_DYNSPEC_PLOTS=␣Y` or `GEN_POW_SPEC_PLOTS=␣Y`
  Format : value in $\frac{\mathrm{nT}^2}{\mathrm{Hz}}$ (e.g. 1e0)
  This keyword specifies the upper limit of the spectral density axis plot range in the spectra plots.

- `PLOT_AMP_MIN=␣`
  Mandatory, if `GEN_DYNSPEC_PLOTS=␣Y` or `GEN_POW_SPEC_PLOTS=␣Y`
  Format : value in $\frac{\mathrm{nT}^2}{\mathrm{Hz}}$ (e.g. 1e-4)
  This keyword specifies the lower limit of the spectral density axis plot range in the spectra plots.

- `PLOT_FREQ_END=␣`
  Mandatory, if `GEN_DYNSPEC_PLOTS=␣Y` or `GEN_POW_SPEC_PLOTS=␣Y`
  Format : value in mHz (e.g 1000)
  This keyword specifies the upper limit of the frequency axis plot range in the spectra plots.

- `PLOT_FREQ_START=␣`
  Mandatory, if `GEN_DYNSPEC_PLOTS=␣Y` or `GEN_POW_SPEC_PLOTS=␣Y`
  Format : value in mHz (e.g. 0)
  This keyword specifies the lower limit of the frequency axis plot range in the spectra plots.

- `PLOT_TIME_END=␣`
  Mandatory, if `GEN_PLOTS=␣Y`
  Format: hh:mm:ss
  This keyword specifies the upper limit of the time axis plot range.

- `PLOT_TIME_START=␣`
  Mandatory, if `GEN_PLOTS=␣Y`
  Format: hh:mm:ss
  This keyword specifies the lower limit of the time axis plot range.

- `PUT_DATA=␣`
  Necessary Keyword!
  Valid values:

  – `N` (for No)
  – `Y` (for Yes)

  This keyword controls the output data transfer. If enabled, the generated data will be automatically copied to the IGEP ftp–server. If disabled the data will only be saved on the local machine.

- `QUAL_FILE=␣`
  Mandatory, if `SET_QUAL_FLAGS=␣Y`
  Valid values:

  – Filename of the actual source file for the quality flag data. The complete name including path has to be stated.

- `REFERENCE_BODY=␣`
  Optional Keyword!
  Valid values:
  - `SUN`
  - `EARTH`
  - `MARS`

  This keyword defines the used coordinate system center. If the keyword is not set, the default, 'SUN', is taken. In the case of 'SUN' the DDS ORHR files will be used to retrieve Orbit information. If 'EARTH' is set, the ORER files will be used, and if 'MARS' is set, then the ORMR files are used. The keyword influences the LEVEL_C (and higher) data and plot output.

- `RESAMPLED_AVERAGE=␣`
  Mandatory, if `GEN_LEV_E_DATA=␣Y` or `GEN_LEV_F_DATA=␣Y` or `GEN_LEV_G_DATA=␣Y`
  Valid values:
  - number (in seconds)

  This keyword defines the period over which the data shall be averaged.

- `RW_FILE=␣`
  Mandatory, if `GEN_LEV_H_DATA=␣Y`
  Valid values:
  - Filename of the actual Reaction wheel frequency file. The complete name including path has to be stated.

- `SAMPLE_FREQ=␣`
  Mandatory, if `GEN_LEV_H_DATA=␣Y`
  Valid values:
  - Frequency values in Hertz.

  This keyword informs the s/w about the actual NOMINAL sampling frequency. This is needed for the RW-Correction algorithm as there is no automatic possibility to decide which sensor is the primary one. So, e.g. for SID3 OB as primary define `SAMPLE_FREQ=␣20.0`, for SID3 IB as primary sensor use `SAMPLE_FREQ=␣1.0`. The s/w takes the difference between nominal and real sampling frequency into account.

- `SET_QUAL_FLAGS=␣`
  Optional Keyword!
  Valid values:
  - Y: Quality flags will be updated in TAB files
  - N: No action related to quality flags

The file selection of the TAB files to be updated is done via the `DAY`, `FILE_MODE`, and `FILE_SELECT` keywords. The `FILE_SELECT` has the highest priority and will be used exclusively if the string length of file mode value exceeds 5 characters.The selection is done using the following command
`selection=␣file_selection␣`

If not stated or the length is below 5 chars, the file selection is done via `DAY` and `FILE_MODE` in the following way:

```
selection=␣MAIN_DIR+'*'+today_year_+today_month+today_day+'*'+file_mode+'*.TAB'␣
```

If no `FILE_MODE` is set, all files of the assigned day will be processed.

- `SMOOTHING_WIN=␣`
  Optional Keyword!
  Valid values:
  - 0: No smoothing
  - 3 . . . 15, value has to be odd

  This keyword controls the smoothing of the spectra output. A value of 0 means, that the output picture will not be smoothed. The higher the value, the higher the smoothing effect. 11 is the default value. 11 is good for Burst data. For 1 s data a value of 7 is reasonable.

- `SPEC_SOURCE=␣`
  Mandatory keyword, if `GEN_DYNSPEC_PLOTS=␣Y` or `GEN_POW_SPEC_PLOTS=␣Y`
  Valid values:
  - `LEVEL\_A`
  - `LEVEL\_B`
  - `LEVEL\_C`
  - `LEVEL\_K`
  - `LEVEL\_L`
  - `LEVEL\_E`
  - `LEVEL\_F`
  - `LEVEL\_G`
  - `LEVEL\_H`
  - `LEVEL\_I`
  - `LEVEL\_J`

  This keywords specifies the input data for the spectrum plots. All calibrated data level can be chosen to act as the source for the desired plots.

- `START:`
  Necessary Keyword!
  This keyword has to be the first command of a block and starts a command block definition.

6.2 Example of a Command File

```
# FILE: PDS.CMD
# Command file for automatic PDS & Plot generation
# A block is delimited by  START: and END: .
# The File can contain several blocks
# Description
#START:                              ; Beginning of Block
#REFERENCE_BODY= EARTH               ; SUN, MARS..; coord. Sys. center; select. for ORHR,ORER,ORMR files
#INSTRUMENT=                         ; RPCMAG or ROMAP - if not stated RPCMAG will be used
#CAL_FILE_ID= nnn                    ; GND or nnn, 001,002... for desired cal file designator
#GEN_TEMP_MODEL=                     ; normaly N, if Y temperature model files will be created
#DAY= yyyy-mm-dd                     ; day to be analyzed
#BOOM= STOWED,DEPLOYED,TEXT          ; not necessary, DEPLOYED is default
#FILE= D:\Rossetta\data\test.cmd     ; low level command file to be executed
#FILE_MODE= M3                       ; only mode Mx data will be generated or plotted,not necessary
#FILE_MODE= OB_M3                    ; only mode OB_M3 data will be generated or plotted,not necessary
#FILE_SELECT= D:\ROSETTA\rpcPDS\rpCmag\work\data\RPCMA040909T0100*CLC*OB*
#GET_DATA= N / Y                     ; Get data from ftp server and start MATLAB
#CAL_DATA= N / Y                     ; read MATLAB output and generate PDS files
#GEN_LEV_E_DATA= N /Y                ; average data from ALL modes
#GEN_LEV_F_DATA= N /Y                ; average data from ALL modes
#GEN_LEV_G_DATA= N /Y                ; average data from ALL modes
#GEN_LEV_H_DATA= N /Y                ; generate RW corrected data
#GEN_LEV_I_DATA= N /Y                ; average LEVEL_H data of all modes
#GEN_LEV_J_DATA= N /Y                ; process PCA
#GEN_LEV_K_DATA= N /Y                ; generate heater influence corrected data in s/c coords.
#GEN_LEV_L_DATA= N /Y                ; generate heater influence corrected data in ECLIPJ2000 coords.
#RESAMPLED_AVERAGE= <seconds>        ;
#FILE_TIME_START= hh:mm:ss           ; not Necessary
#FILE_TIME_END= hh:mm:ss             ; not Necessary
#PUT_DATA= Y / N                     ; put pds to ftp server
#GEN_PLOTS= Y / N                    ; generate plots
#GEN_RAW_PLOTS=  Y / N               ; gen. RAW data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_A_PLOTS= Y/N                ; gen. LEVEL_A data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_B_PLOTS= Y/N                ; gen. LEVEL_B data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_C_PLOTS= Y/N                ; gen. LEVEL_C data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_D_PLOTS= Y/N                ; gen. LEVEL_D data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_E_PLOTS= Y/N                ; gen. LEVEL_E data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_F_PLOTS= Y/N                ; gen. LEVEL_F data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_G_PLOTS= Y/N                ; gen. LEVEL_G data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_H_PLOTS= Y/N                ; gen. LEVEL_H data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_I_PLOTS= Y/N                ; gen. LEVEL_I data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_J_PLOTS= Y/N                ; gen. LEVEL_J data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_K_PLOTS= Y/N                ; gen. LEVEL_K data plots, only necessary if GEN_PLOTS=Y
#GEN_LEV_L_PLOTS= Y/N                ; gen. LEVEL_L data plots, only necessary if GEN_PLOTS=Y
#GEN_DYNSPEC_PLOTS= N                ; gen. SPECTRUM plots, only necessary if GEN_PLOTS=Y
#LEVEL_F_SOURCE= LEVEL_B /LEVEL_K    ; input source for LEVEL\_F data
#LEVEL_G_SOURCE= LEVEL_C /LEVEL_L    ; input source for LEVEL\_G data
#LEVEL_H_SOURCE= LEVEL_B /LEVEL_L    ; input source for LEVEL\_H data
#DYNSPEC_WIN_WIDTH= 7                ; window width as 2^n e.g. 2^7; increas. n sharpens the f resolution
#GEN_POW_SPEC_PLOTS= Y /N            ; gen. POWER_SPECTRUM plots, only necessary if GEN_PLOTS=Y
#SPEC_SOURCE= LEVEL_B                ; LEVEL_A,LEVEL_B,LEVEL_C,LEVEL_E,LEVEL_F,LEVEL_G,LEVEL_H,LEVEL_I
```

```
#PCA_SOURCE= LEVEL_G                ; LEVEL_G or LEVEL_I
#PLOT_TIME_START= hh:mm:ss          ; necessary if GEN_PLOTS=Y
#PLOT_TIME_END= hh:mm:ss            ; necessary if GEN_PLOTS=Y
#PLOT_FREQ_START= 0                 ; start frequency in mHz
#PLOT_FREQ_END= 0                   ; end frequency in mHz
#PLOT_AMP_MIN= 1e-4
#PLOT_AMP_MAX= 1e0
#RW_FILE= D:\Rossetta\data\REACTION_WHEEL\DATA\ASCII\rwheel_2004_SEP0710.txt ; rw file name
#SAMPLE_FREQ= 20.0                  ; sampling frequency in Hertz
#QUAL_FILE= D:\ROSETTA\DATA\QUALITY\quality_index.txt
#SET_QUAL_FLAGS= Y/N                ; quality flags to be updated in TAB file. Source is QUAL_FILE
#DEL=                               ; file to be deleted maindir =D:\rosetta\rpcdps\rpcmadg\work
#ACTION:                            ; Start processing
#END:
#
#
################################################################################


START:
DAY= 2004-03-17
CAL_FILE_ID= 002
BOOM= STOWED
FILE_MODE =
GET_DATA= N
CAL_DATA= N
GEN_LEV_E_DATA= Y
FILE_TIME_START =
FILE_TIME_END =
PUT_DATA= N
GEN_PLOTS= Y
GEN_RAW_PLOTS= N
GEN_LEV_A_PLOTS= Y
GEN_LEV_B_PLOTS= N
GEN_LEV_C_PLOTS= N
GEN_LEV_D_PLOTS= N
GEN_LEV_E_PLOTS= Y
GEN_LEV_K_PLOTS= Y
GEN_LEV_L_PLOTS= Y
RESAMPLED_AVERAGE= 60
GEN_DYNSPEC_PLOTS= N
GEN_POW_SPEC_PLOTS= N
SPEC_SOURCE= LEVEL_A
PLOT_TIME_START= 22:50:00
PLOT_TIME_END= 24:00:00
PLOT_FREQ_START =
PLOT_FREQ_END =
PLOT_AMP_MIN= 1e-4
PLOT_AMP_MAX= 1e0
ACTION:
END:
```

```
START:
DAY= 2004-03-19
CAL_FILE_ID= 002
BOOM= STOWED
FILE_MODE= M3
GET_DATA= N
CAL_DATA= N
FILE_TIME_START =
FILE_TIME_END =
PUT_DATA= N
GEN_PLOTS= Y
GEN_RAW_PLOTS= N
GEN_LEV_A_PLOTS= N
GEN_LEV_B_PLOTS= Y
GEN_LEV_C_PLOTS= N
GEN_LEV_D_PLOTS= Y
GEN_DYNSPEC_PLOTS= N
GEN_POW_SPEC_PLOTS= Y
SPEC_SOURCE= LEVEL_B
PLOT_TIME_START= 01:30:00
PLOT_TIME_END= 03:30:00
PLOT_FREQ_START= 1000
PLOT_FREQ_END= 10000
PLOT_AMP_MIN= 1e-4
PLOT_AMP_MAX= 1e0
ACTION:
END:
##########################################################################################################
```

7 File format of *RAW2ASCII* files

7.1 Input files

As input files the original ROSETTA TM files **.ALL* from the DDS are used. Preferably all files for one single day should be glued together.

7.2 Output files

RAW2ASCII converts one input file to various output files. These files are split up by sensor and mode.

7.2.1 Housekeeping files

FORMAT			
Filename:	RPCMAG{yymmdd}T{hhmm}_RAW_HK.ASC		
Header	# ...		
Datacolumn	1.	Timestring (SCET in UTC)	{yyyy-mm-dd}T{hh}:{mm}:{ss}.{ffffff}
	2.	S/C CLOCK OBT	{nnnnnnnnnnn}.{nnnnn}
	3.	Temperature OB	ADC Value
	4.	Temperature IB	ADC Value
	5.	Stage A ID	Value
	6.	Stage B ID	Value
	7.	Filter Config	Value
	8.	MAG Ref. Voltage	ADC Value
	9.	MAG Neg. Supply Volt.	ADC Value
	10.	MAG Pos. Supply Volt.	ADC Value
	11.	MAG Bx (OB)	ADC Value
	12.	MAG By (OB)	ADC Value
	13.	MAG Bz (OB)	ADC Value

Example:

```
# FILE= RPCMAG040317T2257_RAW_HK.ASC
# SCET OBT TEMPOB TEMPIB STAGEA-ID STAGEB-ID FILTERCFG MAGREFVOLTAGE MAGUB- MAGUB+ MAGX MAGY MAGZ
2004-03-17T22:58:30.536251 38185096.99753    12441    12766        1        2        0   262117    252     31   65181   65382   2236
2004-03-17T22:59:02.536262 38185128.99753    12447    12768        1        2        0   262120    252     31   65177   65384   2233
2004-03-17T22:59:34.536273 38185160.99753    12453    12771        1        2        0   262122    252     31   65166   65384   2240
2004-03-17T23:00:06.536284 38185192.99753    12458    12775        1        2        0   262124    252     31   65163   65381   2241
2004-03-17T23:00:38.536295 38185224.99753    12464    12779        1        2        0   262120    252     31   65165   65381   2242
2004-03-17T23:01:10.536307 38185256.99753    12470    12783        1        2        0   262123    252     31   65164   65383   2242
2004-03-17T23:01:42.536318 38185288.99753    12476    12788        1        2        0   262123    252     31   65163   65381   2243
```

7.2.2 Magnetic field files

FORMAT			
Filename:	RPCMAG{yymmdd}T{hhmm}_RAW_{OB|IB}_M{mode}.ASC		
Header	# ...		
Datacolumn	1.	Timestring (SCET in UTC)	{yyyy-mm-dd}T{hh}:{mm}:{ss}.{ffffff}
	2.	S/C CLOCK OBT	{nnnnnnnnnnn}.{nnnnn}
	3.	MAG Bx	20 bit ADC Value
	4.	MAG By	20 bit ADC Value
	5.	MAG Bz	20 bit ADC Value
	6.	Sensor Temperature	20 bit ADC Value
	7.	Quality	Value

Example:

```
# FILE= RPCMAG040317T2257_RAW_OB_M4.ASC
# MODE= SID4 MEDIUM MODE
# SENSOR= OB
# SCET OBT BX[COUNTS] BY[COUNTS] BZ[COUNTS] MAGTHERM1[COUNTS] QUALITY[]
2004-03-17T22:57:28.586979 38185035.04828    -5483    -2366    35817        0  0
2004-03-17T22:57:28.786979 38185035.24828    -5490    -2372    35814        0  0
2004-03-17T22:57:28.986979 38185035.44828    -5495    -2382    35812        0  0
2004-03-17T22:57:29.186979 38185035.64828    -5497    -2394    35814        0  0
2004-03-17T22:57:29.386979 38185035.84828    -5498    -2403    35818        0  0
```

8 File format of PDS files

A complete set of PDS files consists of two files:

- the LABEL file **.LBL*, which contains information about the data measured.
- the data file **.TAB* containing an ASCII table of data.

8.1 Example: A generated PDS label file (**.LBL*)

```
PDS_VERSION_ID                = PDS3
LABEL_REVISION_NOTE           = "V1.0"
RELEASE_ID                    = 0001
REVISION_ID                   = 0000
RECORD_TYPE                   = FIXED_LENGTH
RECORD_BYTES                  = 125
FILE_RECORDS                  = 85435
DATA_SET_ID                   = "RO-E-RPCMAG-3-EAR1-CALIBRATED-V1.0"
DATA_SET_NAME = "ROSETTA-ORBITER EARTH RPCMAG 3 EAR1 CALIBRATED V1.0"
PRODUCT_ID                    = "RPCMAG050301T0014_CLC_OB_M2"
PRODUCT_CREATION_TIME         = 2007-04-17T15:25:33
PRODUCT_TYPE                  = "RDR"
MISSION_ID                    = "ROSETTA"
MISSION_NAME                  = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME            = "EARTH SWING-BY 1"
INSTRUMENT_HOST_ID            = "RO"
INSTRUMENT_HOST_NAME          = "ROSETTA-ORBITER"
INSTRUMENT_ID                 = "RPCMAG"
INSTRUMENT_NAME = "ROSETTA PLASMA CONSORTIUM - FLUXGATE MAGNETOMETER"
INSTRUMENT_TYPE               = "MAGNETOMETER"
INSTRUMENT_MODE_ID            = "SID2"
INSTRUMENT_MODE_DESC          = "
 NORMAL MODE: 32 PRIMARY & 1 SECONDARY VECTORS PER 32 SECONDS"
TARGET_NAME                   = "EARTH"
TARGET_TYPE                   = "PLANET"
START_TIME                    = 2005-03-01T00:14:40.654
STOP_TIME                     = 2005-03-01T23:59:59.498
NOTE = "
 MAGNETIC_COORDINATE_SYSTEM : ECLIPJ2000"
COORDINATE_SYSTEM_CENTER_NAME  = "SUN"
SPACECRAFT_CLOCK_START_COUNT   = "1/68256861.20971"
SPACECRAFT_CLOCK_STOP_COUNT    = "1/68342380.09737"

START_JULIAN_DATE_VALUE       = 2453430.5101927551
STOP_JULIAN_DATE_VALUE        = 2453431.4999941904
SC_SUN_POSITION_VECTOR        = ( 141029080.44, -49951700.29,     73686.10)
SC_TARGET_POSITION_VECTOR     = (   1358534.84,   -322205.99,     73167.86)
SC_TARGET_VELOCITY_VECTOR     = (        -3.85,         0.86,        -0.22)
SPACECRAFT_ALTITUDE           =     1391758.931
SUB_SPACECRAFT_LATITUDE       =  999.999
SUB_SPACECRAFT_LONGITUDE      =  999.999
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.
    SUB_SPACECRAFT_LATITUDE and SUB_SPACECRAFT_LONGITUDE
    are northern Latitude and eastern Longitude in the standard
    planetocentric IAU_<TARGET_NAME> frame. All values are computed
    for the time t= START_TIME.
    Distances are given in <km> velocities in <km/s>, Angles in <deg>"
SPICE_FILE_NAME               = "ATNR_P040302093352_00053.BC"
SPICE_FILE_NAME               = "ROS_LBOOM_V0.B"
SPICE_FILE_NAME               = "ROS_V11.TF"
SPICE_FILE_NAME               = "EARTH_TOPO_050714.TF"
SPICE_FILE_NAME               = "EARTHFIXEDIAU.TF"
SPICE_FILE_NAME               = "EARTHFIXEDITRF93.TF"
SPICE_FILE_NAME               = "ROS_RPC_V11.TI"
SPICE_FILE_NAME               = "NAIF0008.TLS"
SPICE_FILE_NAME               = "PCK00008.TPC"
```

```
SPICE_FILE_NAME                = "DE403-MASSES.TPC"
SPICE_FILE_NAME                = "EARTH_000101_060918_060627.BPC"
SPICE_FILE_NAME                = "ROS_070312_STEP.TSC"
SPICE_FILE_NAME                = "DE405.BSP"
SPICE_FILE_NAME                = "ORER_____________00031.BSP"
SPICE_FILE_NAME                = "ORHR_____________00052.BSP"

PRODUCER_ID                    = "RPC_MAG_TEAM"
PRODUCER_FULL_NAME             = "INGO RICHTER"
PRODUCER_INSTITUTION_NAME      = "IGEP-TU-BRAUNSCHWEIG"
DATA_QUALITY_ID                = "N/A"
DATA_QUALITY_DESC              = "
 ONLY 'GOOD' RAW DATA HAVE BEEN PROCESSED AND STORED"
PROCESSING_LEVEL_ID            =  3

DESCRIPTION                    = "
 THIS FILE CONTAINS CALIBRATED MAGNETIC FIELD VECTOR DATA OBTAINED BY THE
 OUTBOARD MAGNETOMETER ABOARD THE ROSETTA S/C. GROUND CALIBRATION RESULTS HAVE
 BEEN APPLIED TO THE RAW DATA. FIELD IS ROTATED TO ECLIPJ2000 COORDINATES.
 THE S/C POSITION IS  GIVEN IN ECLIPJ2000 COORDINATES AS WELL."
NOTE                           = "
 LBL & TAB FILE HAVE BEEN GENERATED BY S/W: GEN_CAL_DATA, VERSION V20070330"
NOTE                           = "
 S/C ATTITUDE COMPUTED USING FILE ATNR_FDRRMA_DAP040302093352_00053.ROS"
NOTE                           = "
 S/C POSITION COMPUTED USING FILE ORHR_FDRRMA_DA_____________00052.ROS"
NOTE                           = "
 GROUND CALIBRATION FILE: RPCMAG_GND_CALIB_FSDPU_FMOB.TXT"
NOTE                           = "
 INFLIGHT CALIBRATION FILE: RPCMAG_002_CALIB_OB.TXT"
FLIGHT_SOFTWARE_VERSION_ID     = "FIL:V1.0"
PLATFORM_OR_MOUNTING_DESC      = "MAGNETOMETER_BOOM: DEPLOYED"

^TABLE             = "RPCMAG050301T0014_CLC_OB_M2.TAB"

OBJECT             = TABLE
NAME               = "RPCMAG-OB-SID2-CLC"
INTERCHANGE_FORMAT = ASCII
ROWS               = 85435
COLUMNS            = 9
ROW_BYTES          = 125

OBJECT             = COLUMN
NAME               = "TIME_UTC"
DATA_TYPE          = TIME
START_BYTE         = 1
BYTES              = 26
DESCRIPTION        = "UTC TIME OF OBSERVATION: YYYY-MM-DDTHH:MM:SS.FFFFFF"
END_OBJECT         = COLUMN


OBJECT             = COLUMN
NAME               = "TIME_OBT"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 28
BYTES              = 15
DESCRIPTION        = "S/C CLOCK AT OBSERVATION TIME,SECONDS SINCE 00:00 AT
 1.1.2003: SSSSSSSSS.FFFFF"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "POSITION_X"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 44
BYTES              = 13
UNIT               = "KILOMETER"
UNIT_ID            = "km"
DESCRIPTION        = "SPACECRAFT POSITION, X COMPONENT, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "POSITION_Y"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 58
BYTES              = 13
UNIT               = "KILOMETER"
UNIT_ID            = "km"
DESCRIPTION        = "SPACECRAFT POSITION, Y COMPONENT, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "POSITION_Z"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 72
```

```
BYTES              = 13
UNIT               = "KILOMETER"
UNIT_ID            = "km"
DESCRIPTION        = "SPACECRAFT POSITION, Z COMPONENT, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "BX_OB"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 86
BYTES              = 9
UNIT               = "NANOTESLA"
UNIT_ID            = "nT"
DESCRIPTION        = "MAGNETIC FIELD X COMPONENT, CALIBRATED, TEMPERATURE
 CORRECTED DATA, OB SENSOR, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "BY_OB"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 96
BYTES              = 9
UNIT               = "NANOTESLA"
UNIT_ID            = "nT"
DESCRIPTION        = "MAGNETIC FIELD Y COMPONENT, CALIBRATED, TEMPERATURE
 CORRECTED DATA, OB SENSOR, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "BZ_OB"
DATA_TYPE          = ASCII_REAL
START_BYTE         = 106
BYTES              = 9
UNIT               = "NANOTESLA"
UNIT_ID            = "nT"
DESCRIPTION        = "MAGNETIC FIELD Z COMPONENT, CALIBRATED, TEMPERATURE
 CORRECTED DATA, OB SENSOR, ECLIPJ2000"
END_OBJECT         = COLUMN

OBJECT             = COLUMN
NAME               = "QUALITY_FLAGS"
DATA_TYPE          = CHARACTER
START_BYTE         = 116
BYTES              = 8
DESCRIPTION        = "
 These flags describe the quality of the magnetic field data.
 The quality is coded in a 8 byte string. Each character can have
 the following values:
  VALUE:    MEANING:
    x       property described by flag is still unknown
    0       no disturbance, good quality
    1..9    specific disturbance/problems, see below

 Description of the specific flags:

 FLAG-STRING FLAG DESCRIPTION
 87654321
  ::::::::------ 1 IMPACT OF REACTION WHEELS
  :::::::          x = impact not assessed
  :::::::          0 = no disturbance
  :::::::          1 = disturbance eliminated during data analysis
  :::::::          2 = disturbance elimination failed
  :::::::          3 = data disturbed
  ::::::::
  :::::::------- 2 IMPACT OF LANDER HEATER CURRENTS:
  ::::::           x = impact not assessed
  ::::::           0 = no disturbance
  ::::::           1 = disturbance eliminated during data analysis
  ::::::           2 = disturbance elimination failed
  ::::::           3 = data disturbed
  ::::::
  ::::::-------- 3 BOOM DEPLOYMENT:
  :::::            0 = boom deployed
  :::::            1 = boom stowed
  :::::            2 = boom deployment ongoing. Data only valid in
  :::::                instrument coordinates
  :::::            3 = pyros fired for boom release
  :::::
  :::::--------- 4 OFFSET RELATED EFFECTS:
  ::::             x = offset issues not assessed
  ::::             0 = no offset problems
  ::::             1 = offset behavior not clear
  ::::             2 = offset drifts, sensor not in thermal
  ::::                 equilibrium thus temperature model N/A
```

```
  ::::             3 = offset drifts, reason unknown
  ::::             4 = ofset jump detected, reason unknown
  ::::
  ::::---------- 5 CORRELATION BETWEEN IB AND OB SENSOR
  :::              x = correlation not assessed
  :::              0 = perfect correlation
  :::              1 = good correlation
  :::              2 = poor correlation
  :::              3 = IB and OB show different long term behavior
  :::
  :::
  :::----------- 6 OTHER IMPACTS DECREASING THE QUALITY
  ::               x = no assessment
  ::               0 = no other problems detected
  ::               1 = TBD
  ::               2 = TBD
  ::               3 = TBD
  ::               4 = TBD
  ::               5 = data disturbed by AC signal originated in s/c
  ::               6 = data noisy due to power on failure
  ::               7 = data not calculatable due to thermistor failure
  ::               8 = sensor saturated due to huge external field
  ::               9 = sensor saturated, instrument power on sequence failed
  ::
  ::------------ 7 TBD
  :                x = no assessment
  :
  :------------- 8 TBD
  :                x = no assessment
  :
     "
END_OBJECT         = COLUMN
END_OBJECT         = TABLE
END
```

8.2 Example: A generated PDS data file (**.TAB*)

```
2004-05-08T11:18:27.536951  42635892.48346  -72425206.90 -112079955.03    929862.30     -9.70     15.24     16.59 xx510003
2004-05-08T11:18:59.959398  42635925.10495  -72424287.33 -112080504.45    929863.90     -8.60     14.18     14.15 xx510003
2004-05-08T11:19:31.991236  42635957.12581  -72423378.83 -112081047.24    929865.48     -9.61     14.64     15.14 xx510003
2004-05-08T11:20:04.023074  42635989.14667  -72422470.32 -112081590.03    929867.06    -10.24     15.12     16.88 xx510003
2004-05-08T11:20:36.055019  42636021.16760  -72421561.81 -112082132.81    929868.64    -12.48     13.09     18.35 xx510003
2004-05-08T11:21:08.086872  42636053.18847  -72420653.30 -112082675.59    929870.21    -12.37     13.57     18.86 xx510003
2004-05-08T11:21:40.118710  42636085.20933  -72419744.78 -112083218.36    929871.79    -10.47     14.73     18.32 xx510003
2004-05-08T11:22:12.150654  42636117.23025  -72418836.26 -112083761.12    929873.37    -11.01     14.34     17.46 xx510003
2004-05-08T11:22:44.182492  42636149.25111  -72417927.73 -112084303.88    929874.95    -10.09     11.26     22.05 xx510003
2004-05-08T11:23:16.214330  42636181.27197  -72417019.21 -112084846.62    929876.53    -10.52     13.33     21.14 xx510003
2004-05-08T11:23:48.246275  42636213.29291  -72416110.67 -112085389.37    929878.11    -10.12     14.41     20.18 xx510003
2004-05-08T11:24:20.278113  42636245.31377  -72415202.13 -112085932.10    929879.69     -9.95     13.79     15.15 xx510003
2004-05-08T11:24:52.309951  42636277.33463  -72414293.59 -112086474.83    929881.26    -10.55     14.34     16.25 xx510003
2004-05-08T11:25:24.341911  42636309.35557  -72413385.04 -112087017.56    929882.84    -10.66     14.35     19.24 xx510003
....
```

9 File format of LaTeXoutput file *PLOTFILES.TEX*

```
%================================================================================
%================================================================================
%                   PLOTS OF  DAY: 2004-05-07
%================================================================================
%================  Actual Time: Thu Sep 02 09:23:16 2004
%================================================================================
\def\fileA{\special{psfile=D:/Rosetta/rpcPds/rpcMag/work/PLOTS/CALIBRATED/2004/
                    MAY/LEVEL_A/HK/RPCMAG040507T2033_CLA_HK_P2000_2400_002.EPS
                    vscale = 80 hscale = 80 angle=0 }}
\begin{figure}[h]
   \begin{center}
   \setlength{\unitlength}{1cm}
   \begin{picture}(15.0,21)(0,0)
   \put(-1.0,0.0){ \fileA }
   \put( -1.00, 1.00){\framebox(17.0,21){}}
   \end{picture}
   \caption{File: RPCMAG040507T2033\_CLA\_HK\_P2000\_2400\_002}
   \label{RPCMAG040507T2033_CLA_HK_P2000_2400_002}
   \end{center}
\end{figure}
\clearpage


\def\fileA{\special{psfile=D:/Rosetta/rpcPds/rpcMag/work/PLOTS/CALIBRATED/2004/
                    MAY/LEVEL_A/HK_B/RPCMAG040507T2033_CLA_HK_B_P2000_2400_002.EPS
                    vscale = 80 hscale = 80 angle=0 }}
\begin{figure}[h]
   \begin{center}
   \setlength{\unitlength}{1cm}
   \begin{picture}(15.0,21)(0,0)
   \put(-1.0,0.0){ \fileA }
   \put( -1.00, 1.00){\framebox(17.0,21){}}
   \end{picture}
   \caption{File: RPCMAG040507T2033\_CLA\_HK\_B\_P2000\_2400\_002}
   \label{RPCMAG040507T2033_CLA_HK_B_P2000_2400_002}
   \end{center}
\end{figure}
\clearpage


\def\fileA{\special{psfile=D:/Rosetta/rpcPds/rpcMag/work/PLOTS/CALIBRATED/2004/
                    MAY/LEVEL_B/OB/RPCMAG040507T2339_CLB_OB_M5_T2000_2400_002.EPS
                    vscale = 80 hscale = 80 angle=0 }}
\begin{figure}[h]
   \begin{center}
   \setlength{\unitlength}{1cm}
   \begin{picture}(15.0,21)(0,0)
   \put(-1.0,0.0){ \fileA }
   \put( -1.00, 1.00){\framebox(17.0,21){}}
   \end{picture}
```

```
   \caption{File: RPCMAG040507T2339\_CLB\_OB\_M5\_T2000\_2400\_002}
   \label{RPCMAG040507T2339_CLB_OB_M5_T2000_2400_002}
   \end{center}
\end{figure}
\clearpage


\def\fileA{\special{psfile=D:/Rosetta/rpcPds/rpcMag/work/PLOTS/CALIBRATED/2004/
                    MAY/LEVEL_B/IB/RPCMAG040507T2339_CLB_IB_M5_T2000_2400_002.EPS
                    vscale = 80 hscale = 80 angle=0 }}
\begin{figure}[h]
   \begin{center}
   \setlength{\unitlength}{1cm}
   \begin{picture}(15.0,21)(0,0)
   \put(-1.0,0.0){ \fileA }
   \put( -1.00, 1.00){\framebox(17.0,21){}}
   \end{picture}
   \caption{File: RPCMAG040507T2339\_CLB\_IB\_M5\_T2000\_2400\_002}
   \label{RPCMAG040507T2339_CLB_IB_M5_T2000_2400_002}
   \end{center}
\end{figure}
\clearpage


%------------------------------
% DEL /Q /S D:\Rosetta\rpcPds\rpcMag\work\*040507*CLA*OB*eps
%  Datei wurde gelscht - D:\Rosetta\rpcPds\rpcMag\work\PLOTS\CALIBRATED\2004\MAY\
  LEVEL_A\OB\RPCMAG040507T2339_CLA_OB_M5_T2000_2400_002.EPS
%------------------------------
%------------------------------
% DEL /Q /S D:\Rosetta\rpcPds\rpcMag\work\*040507*CLA*IB*eps
% Datei wurde gelscht - D:\Rosetta\rpcPds\rpcMag\work\PLOTS\CALIBRATED\2004\MAY\
LEVEL_A\IB\RPCMAG040507T2339_CLA_IB_M5_T2000_2400_002.EPS
%------------------------------
%================================================================================
```

10 Ancillary IDL Routines

Additionally to the original *DDS2PDS* software package there are a few extra routines which ease the preparation of the archive data:

10.1 Generation of a Temperature Model

For a proper calibration of the MAG data the right temperature model is essential. It diminishes or even eliminates the temperature influence of the MAG sensor.
The sensors have been calibrated during the Ground calibration in a temperature range down to -60°C. This original Temperature calibration model is applied ALWAYS to the data. It is taken into account using the two files
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_GND_CALIB_FSDPU_FMIB.TXT`
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_GND_CALIB_FSDPU_FMOB.TXT`
However, during flight lower temperatures have been seen. Besides this, hysteretic effects might be possible changing the sensor characteristics in the way that a new correction model becomes necessary. For this purpose the IDL S/W
`CALIB_ROS_TEMP_XXXXXXX.PRO` is used. For the the early mission phases CVP — EAR1 a common model (002) exists, which has been created using `CALIB_ROS_TEMP_002.PRO`
This model simply consists of ONE 3rd order polynomial for each sensor component, derived from CVP — EAR1 data. The DDS2PDS S/W uses the results by reading the parameters from the 2 files: `ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_002_CALIB_IB.TXT`
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_002_CALIB_OB.TXT`
It turned out that the sensor characteristics can be described much better with a model using different polynomials for shorter time intervals. So the model for the MARS and later phases is calculated on the base of daily adapted model parameters. These have been calculated with the S/W `CALIB_ROS_TEMP_MARS_006.PRO`. The related output files to be read by DDS2PDS are listed below:
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_070223_006_CALIB_IB.TXT`
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_070223_006_CALIB_OB.TXT`
...
...
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_070227_006_CALIB_IB.TXT`
`ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_070227_006_CALIB_OB.TXT`
The values in these files are listed in instrument coordinates. For the other mission phases similar files have to be generated with adapted software.

How to achieve a new temperature model?

- Generate averaged (A200) , GND calibrated LEVEL_E data for the desired time period. This is done with the `GEN_TEMP_MODEL=Y` option in the following way: (example) :

```
START:
GEN_TEMP_MODEL= Y
DAY= 2007-02-23
CAL_FILE_ID= GND
GEN_LEV_E_DATA= Y
RESAMPLED_AVERAGE= 200
BOOM= DEPLOYED
GET_DATA= N
CAL_DATA= Y
PUT_DATA= N
GEN_PLOTS= N
ACTION:
END:
```

  The generated data will be written to `D:\ROSETTA\DATA\CALIB\TEMPMODEL_AVG`.

- Copy the just produced data to the actual (possibly new) folder
  `D:\ROSETTA\DATA\CALIB\TEMPMODEL_nnn`
  where *nnn* denotes the number of the new temperature model.

- Ensure the existence of the the polynomial coefficients files
  `ROSETTA\DATA\CALIB\P_COEFF_IB.TXT`
  `ROSETTA\DATA\CALIB\P_COEFF_OB.TXT`

  At least dummy files containing the start and end lines like

```
2000-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
2000-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
2000-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
2024-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
2024-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
2024-01-01T00:00:00   0.0   0.0   0.0   0.0   0.0   0.0
```

  should be present. (ATTENTION: There shouldn't be any entries for days which have not been processed in the right way!) These files will be used to store and read the polynomial coefficients for each day. For every day three lines are used for the X,Y and Z component. The columns are related to TIME, a0 ... a5, the n^{th} order polynomial coefficients.

The coefficients have to be stored in files, because the calibration routine for day (n) looks for the parameters of day $(n-1)$ to ensure that there is no offset jump at the time of the file change. It means that the constraint $P_{n+1}(T_n(0)) \stackrel{!}{=} P_n(T_n(0))$ is fulfilled.

- In the S/W `CALIB_ROS_TEMP_XXXXX.PRO` the desired days have to be adapted. Here also time intervals of data to be used and time intervals not to be used can be chosen for every day.
- After the successful run the following files will be available:
  - The needed calibration files (coefficients in Instrument coords.)
    `ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_<id>_CALIB_IB.TXT`
    `ROSETTA\rpcPds\rpcMag\CALIB\RPCMAG_<id>_CALIB_OB.TXT`
  - Plots of the uncorrected data (s/c - coords.)
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_IB_T_A200_SC_COORDS_ORIGnnn.EPS`
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_OB_T_A200_SC_COORDS_ORIGnnn.EPS`
  - Plots of the corrected data (s/c - coords.)
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_IB_T_A200_SC_COORDS_FITTEDnnn.EPS`
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_OB_T_A200_SC_COORDS_FITTEDnnn.EPS`
  - Plots of the Fit quality (s/c - coords.)
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_IB_T_A200_SC_COORDS_TESTnnn.EPS`
    `ROSETTA\DATA\CALIB\CALIB\RPCMAG_<id>_OB_T_A200_SC_COORDS_TESTnnn.EPS`

Unused time intervals for the model creation are shown in red color.

10.2 Generation of REACTION WHEEL Plots

For the assessment whether the data are disturbed by ROSETTA'S Reaction wheels the actual frequencies of the Reaction wheels have to be known and to be compared with the dynamic spectra of the magnetic field data.
Procedure:

- Retrieve RW-parameters from the ROSETTA DDS located at http://rodds.esa.int/
  - go Back to main page
  - Build Request
  - Request Catalog – TLM
  - Data Source – 196
  - On Screen $\rightsquigarrow$ Catalog Browsing.
    Select 3 25 27 DATA $\rightsquigarrow$ selection Window appears
  - select desired times GTE / LTE
  - Start transfer via ftp,
  - Type in convenient filename,leave Directory as it is, ftp target home, as it is $\rightsquigarrow$ data will be sent to *pegasus.sp.ph.ic.ac.uk /raid/rosetta/rpcData/rpcTmp*
- Save this TM file in
  d:/ROSETTA/DATA/REACTION_WHEELS/TM_DATA (.DAT)*
- File contains the following Reaction wheel parameters:

Parameter	APID	SPID	Byte_Offset	Bit_offset	Type	Subtype	P1Val
NAAD 6014	196	4533	210	3	3	25	27
NAAD 6024	196	4533	212	3	3	25	27
NAAD 6034	196	4533	214	3	3	25	27
NAAD 6044	196	4533	216	3	3	25	27

- additional conversion information:

PTC	PFC	PAdded		
3	9	13	N	13bits unsigned Integer Calibration ID : 478

- Calibration Factor from mcf.dat: 0.50813
- START RVT IDL SOFTWARE:
  - @rvt in *d:/rosetta/rpcpds/rpcmag/software/pcwin/idl/tlm_ascii/rvt*
  - LOAD_DESCRIPTION: *./DES/ros_Wheels.des*
  - OPEN TM file in *d:/ROSETTA/DATA/REACTION_WHEELS/TM_DATA*
  - PLOT: SAVE_TO_ASCII FILE
  - SELECT : NAAD 6014 6024 6034 6044
- Generate plots via *reaction_wheels.pro* , adapt actual settings in source code! Plots can be found in it D:/ROSETTA/DATA/REACTION_WHEELS/PLOTS

10.3 Generation of overview plots and overview about available data

To get an idea at which days data are available in which calibration level several routines exist to generate a complete report. The generation process is the following:

1. Generate a list of all available data using
   create_list_rpcmag_data_overview.pro
   Check actual parameters in source code before running.
   This procedure generates the following list:
   D:/ROSETTA/DATA/AVAILABILITY/RPCMAG_OVERVIEW.LST
   (Name can be adapted)

2. Using this list overview plots about available data level for each day can be produced.
   START: *create_plot_rpcmag_data_overview.pro*
   Check actual parameters in source code before running.
   This routine generates *.PS and *.TEX file for the generation of an overview report.
   Output is written to *D:/ROSETTA/DATA/AVAILABILITY*

3. An automatic quality check of all LEVEL_F data can be performed using the routine
   quality_check.pro
   This test is based on checking the thermal equilibrium of the sensors. If a certain threshold of the change rate of the sensor temperature differences is exceeded, the data will be marked as bad. Output is

   - Text files with the time intervals of bad data:
     D:/ROSETTA/DATA/QUALITY/<datasetID>/RESAMPLED/yyyy/month/RPCMAGyymmdd_CLF_QUALITY_FLAGS.TXT
   - Plots of LEVEL_F data with red tagged bad intervals:
     D:/ROSETTA/DATA/QUALITY/<datasetID>/RESAMPLED/yyyy/month/RPCMAGyymmdd_CLF_OBIB.PS
   - Plots of differences (OB-IB) of LEVEL_F data with red tagged bad intervals:
     D:/ROSETTA/DATA/QUALITY/<datasetID>/RESAMPLED/yyyy/month/RPCMAGyymmdd_CLF_DIFF.PS
   - A file named
     D:/ROSETTA/DATA/QUALITY/PLOTFILES.TEX
     which contain a LaTeXcompliant input file of all plots and figures for the report.

   Adapt the parameter of the routine inside the source code before running.

4. Now the report can be generated.
   Use Template for RO-IGEP-TR0017 to produce the desired document.

11 Archive Generation Procedure

This section is a brief do-list for the generation of a data set.

1. Generate the right *PDS.CMD* file using individual sub-files (`FILE=␣`) for each of the following tasks:

   - Get TM data from the ftp server and convert it to ASCII data (`GET_DATA=␣Y`).
   - GND calibrated data have to be created for development of the actual TEMP_MODEL (refer to 10.1).
   - The temperature model has to be created using `CALIB_ROS_TEMP_XXXXX.PRO`
   - RAW and CALIBRATED data have to be created (`CAL_DATA=␣Y`).
   - Time series plots and spectra have to created.
   - If any Lander heater influence is visible, corrected LEVEL_B data tables have to be created (manually or with convenient s/w). The corrected tables have to be written to *D:/ROSETTA/DATA/HEATER*.
     LEVEL_K and LEVEL_L data can be generated from this source.
   - To get an idea about the Reaction wheel influence the Reaction wheel investigation has to be done (refer to section 10.2)
   - Now all needed input for any stage of resampled LEVEL_E, LEVEL_F, LEVEL_G, LEVEL_H, LEVEL_I data is available.

2. Create a data quality overview and availability report. Refer to section 10.3

3. After generation of all data the quality dummies have to be replaced by real Quality flags. For this task a convenient quality index file *D:/ROSETTA/DATA/QUALITY/QUALITY_<missionphase>.TXT* has to be available. Start the replace sequence with `␣SET_QUAL_FLAGS=␣Y` at *DDS2PDS*.

4. After generation of all ancillary files (DOCUMENTS, CALIBRATION,...) in the actual PSA directory the line width of the new *.LBL files has to be set to 80 characters. This can be done with the Software
   do_format_psa_file.pro