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Science Operations Department
Solar System Science Operations Division

ROSETTA

Rosetta Science Operations Centre to Experimenter
Interface Control Document
(RSOC to Experimenter ICD)

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Issue 1/c

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CHANGE RECORD SHEET

Date	Iss.	Rev.	P.	Description/Authority	CR No.
22 Aug - 22 Nov 2000	D	0 - 6		First draft	
15 Jan/22 Jan 2001	D	7/8		incorporate updates from GSDR	
29 Jan 2001	D	9	10 12	pointing request file has two time fields (as the POR/ITL format) format for "include_file" keyword changed	
06 Feb 2001	D	10	all	"last comments" by ESOC (MS and EM) and GS	
10 Sep 2001	D	11	all	update editoral comments by RS	
			2	Added picture "physical interfaces" and corresponding text. Add " (*e.g.* personal communication)" to password updating	
			3	delete "medium- and" in first sentence of 2.2.1.2 Update the way to put files on the DDS	
			4	delete "of the same type" Modify paragraphs on response time.	
			11	delete pointing mode table, refer to PTR document instead	
				In all ITL/EDF formatted files, exchange the comment character from "C" to "#"	
			25	Add details on Telecommand Sequence update requests	
			33	Add reference to Ground Segment System Test Plan	
			all	updated the time formats to YY-DDD...	
22 Sep 2001	D	12	ii	Delete B. Feuerbacher as Lander PM; p. 1 editorials	
				Updated wrt comments from HUK	
			4	add " The confirmation will be done either via an email with attachment or by a ftp put to the computer of the experimenter, depending on the capabilities of the DDS (*tbd*)." to section 1.1.2.2.	
			19	Update Lander-specific interface according RO-ESC-MN-0531.	
24 Sep		13		Editorials: Updated name of Lander PM; added reference to OSIRIS UDP document	
11/12 Oct		14		Updated example of Command Sequence request, add naming conventions for sequence names and sequence parameter names	
			19	Insert Section 3.2.1.9, RSI-specific interface to the RSOC (still empty)	
			21	Insert Section 3.2.3.1, Acknowledge file (ACKN)	
			78	add Appendix D, Format definitions of the keywords and their contents for the acknowledge files	
				Added explanation of "start time" and "end time" in all relevant tables	
			4	add requirement to wait for receipt acknowledge before sending new file	
			32	Add naming conventions for sequences and their parameters	
05 Nov 2001		15	4	Add " In case three erroneous accesses occur, the Spacecraft Operations Manger (SOM) at ESOC shall be contacted by telephone to reset the account"	
2001 Dec 04		15a	32	Add Section on updating TCs, Telecommand Update Requests (TUR)	
			33	Add in example for TC Sequence updates "SEQUENCIAL and PARALLEL must not be used"	
			37	Added section about Flight Control Procedure updates	
2001 Dec 12		16	9	Add bullet (d) on naming convention for ACKN file	
				Appendix D: Replace with new version by Arjan	
				Appendix E: Insert newly. Updated description of the ACKN format, corrected the version number count of the file.	
2002 Jan 14			3	Update last sentence in section 2.2.1: " During co-location at ESOC in Darmstadt, the Experimenter team computers will be located at the Relay LAN. Note that the Lander will have its main computers at the LCC in Cologne, Germany. They will have computer(s) at ESOC which act as a client to the LCC computers."	
2002 Feb 06		19	8, 10, 25, 38, 40	Update file types with "planning" and "preliminary" files, update explanatory text in file descriptions accordingly	DDID/CRID DCR Meeting, 29 Jan 2002
			9	Update definition of the 'xxxxxxxxxxxxx' field in the file name according to the discussion at the DDID/CRID DCR meeting, 29 Jan 2002.	
			21	Clarify "Lander FOP" with "Lander FOP (LFOP)"	comment from P. Schmitz, email Jan 2002
			25	Add/modify text concering traceability. WE now use the Z record of the POR syntax.	DCR 32 for the DDID/CRID D CR

Date	Iss.	Rev.	P.	Description/Authority	CR No.
					Meeting, 29 Jan 2002
			35	Add " Note: It is currently envisaged that the software updates for the Lander ESS will also be passed via this file type, since the Lander does not support Service 6 commands."	email from P. Schmitz to dvk, 30 Jan 2002
			36	Modify OBCP request to follow ITL syntax. Add example.	
			52	add "The Lander will use the Command Sequence change request format (CS__)."	
			42	Add text about configuration control of software items	
06 Feb 2002	1	-	11	Add " This means that to completely cancel a command request file, a new file with empty contents needs to be sent" in section 3.2.1.3.3.	
				upgrade revision for signature at SOWG	
20 Mar 2003	1	A	24	Added explanation to PORP.	Editorial
10 Apr 2003	1	A	9		DCR-001
			1	Changed name of target comet	Editorial
			10, 15, 34	Updated file names: PTR_ is now PTRP, ECF_ is now ECFP, CS__ is now CS_P	DCR-002
			9, 23	Deleted PIX and ALL as destination	DCR-003
			34	Added two-letter abbreviation for SREM (SE)	
			82/83	Added Appendix G describing the syntax for CS_Ps	DCR-004
			34	Updated reference to Appendix G	DCR-004
			36/37	Deleted old Figure 5, refer to Appendix G, update example	DCR-004
			5	Updated email addresses to 'rssd.esa.int' rather than 'esa.int'. Deleted Nicolas Biver.	
			9, 19, 34, 35	Editorials, see DCR for details	DCR-005
			19	Updated RSI interface	DCR-006
			34	Delete sentence "Note: it is currently envisaged…", create new Section on Lander Software Update (3.2.2.5)	Editorial
			21	Deleted Table 10 listing ftp servers of Experimenters. This information is in Appendix D.	DCR-014
			8	Delete RPC instruments except RPC_PIU (PI9)	DCR-009
			3	Update SSD -> RSSD	Editorial
			3	Add sentence with reference to the DDID Appendix L	DCR-010
			3, 4	Updated procedure to ftp files to RSOC	DCR-011
			50ff	Templates, notes, examples are now in a separate document. Refer to it.	
14 Apr 2003	1	A		Appendix D updated with emails of K. Altwegg, C. Lee; new server name of LCC	DCR-013
				In Section 3.2.3.4.3, the paragraph "where name_of_source_file(s) …." is obsolete. Deleted.	DCR-007
			21	Delete paragraph describing comment characters – refer to XML definition	DCR-008
				ITL and EDF examples were moved to another document, the "EPS ICD". This supercedes DCR-012 to update the files.	DCR-012
2003 Nov 18	1	B	3, 4	Add detailed description of how experimenters submit their input (new section 2.2.1.1).	DCR-015
			4, 35	Editorials	DCR-021
			6	Update URLs of web sites	Editorial
			6	Delete text that email is not yet available	Editorial
			31	Replace RSDB with RMIB, add explanation in section 3.3.1, General Definition	Editorial
			36	Refer to RD12 rather than Appendix G of this document	Editorial
			10	Replace PTRP with OIPR	DCR-016
			10	Naming convention updated to be consistent with CRID, i.e. have four digits in 'planning cycle' rather than 'Pnnn'.	DCR-019
			36	Added explanation on who chooses procedure number	Editorial
			39	Section CS_P – added reference to CS_D Added section describing CS_D	DCR-020
			33	Secion TURP – added reference to TURD, added short	DCR-020

Date	Iss.	Rev.	P.	Description/Authority	CR No.
				description on how to format the file. Added section describing TURD and instructions on how to fill out the form sheet.	
			49-51	Added Sections describing MPRD, MDRD, MCRD	DCR-020
			All	Editorials	DCR-021
			77-80	Added Appendix giving table with all file types	DCR-039
22 Mar 2007	1	C	57	Updated the XML configuration file for ORF-A to show the latest information for the PI team computers	DCR-044
			5	Editorials, Added a section “Basic definitions”	DCR-045
17 Jul 2007			6, 7	Add the command ‘ascii’ or ‘bin’ and the relevant explanation	DCR-030
			5	Changed ‘version number’ to ‘sequence number’. Added text to explain when and when not to increment the number as given in DCR	DCR-031
			Several	Added SREM in list of approvers, added SREM in Table 3.	DCR-032
				Added a section describing how to handle files which were submitted erroneously	DCR-034
19 Jul 2007				Added section on OBRs	DCR-047
			60	Added description on how to fill out the OBR template in Appendix J (now called Appendix F)	DCR-047
23 Nov 2007				Updated with editorials as of KWs comments	
			10, 11	Updated free field specification in file name for MCR(P), MDR(P), MPR(P)	DCR-048
					DCR-049

Revisions are indicated by a vertical bar at the outside border.

Open items/expected changes

1. DCR-017, RSI-specific interface definition, was discussed at the CCB 27 Mar 2007 and it was decided to still keep it open until more discussions with the Radio Science team have taken place.

2. DCR-026, UDPs of OSIRIS. The agreement at the CCB meeting 27 Mar 2007 was that RSOC needs to analyse the MPAE-TN-053/2a describing the UDPs and see whether this document helps in the modelling of the instrument. Then, a discussion is needed between RSOC and the OSIRIS team on the way forward in the interface. For the moment, this DCR is open.

3. Section 2.2.1, physical interface – it is expected that the computer setup is updated to remove the machine ‘rofts’ currently located at ESOC in Darmstadt and change the ftp interface from the PI teams to a computer physically located at the SOC in ESAC, Spain. This will happen in Jan 2008 – needs DCR.

4. RSOC should double-check with RMOC whether the ‘Expedite Command Requests’ will really be implemented.

5. Section 3.2.2 needs to be rediscussed – Lander-specific interfaces. It says that the LOP will be delivered in ITL syntax.

6. In all format tables, columns are given as having fixed width. Is this really needed? Discuss, but needs a DCR.

7. In Section 3.2.1.3.1, 3.2.1.3.3., 3.2.1.3.4, the POR syntax is still allowed. This syntax is not used for this interface, the sections should be deleted. DCR needs to be generated for this.

8. The 'Reference Pointing Information (RPI)' is in a PTR file. Rather than specifying the format, refer to the relevant document.

9. Section 3.3.2.3 has to be updated – needs DCR.

10. The files of type PP (Power Profile) and DV (Data Volume) have so far not been used, also it seems doubtful that they'll be needed in view of the possibility of including 'Z-records' in the ITL files. Can they be removed? Create DCR.

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1. INTRODUCTION

Rosetta is the third cornerstone mission of the ESA long term scientific program Horizon 2000. Initially, it was planned to be launched in January 2003 to comet 46P/Wirtanen; after an Ariane launch failure it was decided to postpone the mission. The target now is 67P/Churyumov-Gerasimenko, the launch took place on 02 Mar 2004.

A Rosetta Science Operations Team (SOT) has been established to perform the scientific operational planning for this mission. The SOT together with their infrastructure forms the Rosetta Science Operations Centre (RSOC).

The general concepts of how the planning will be done are described in AD8, the top level document "RSOC Design Specification" (note that this document was formerly called "RSOC Design Concept"). This document will concentrate only on the formal definition of the interfaces between the Experimenter teams and the RSOC with all their technical formats.

1.1 Purpose and Scope

The purpose of this document is to specify the operational interfaces and procedures between RSOC and the ROSETTA orbiter PI and Lander teams (henceforth called "Experimenter teams") that are required to support ROSETTA science operations.

The areas addressed in this document include:

- the generic interfaces required to support the above functionality;
- any PI-specific interfaces required to support the above functionality;
- standards for exchange of software and data;
- testing of the interfaces;
- training in the use of the interfaces.

1.2 Applicable Documents

AD 01 Experiment Interface Document Part A (EID-A), RO-EST-RS-3001/2.1, 01 Oct 2000.
AD 02 Science Operations Implementation Agreement (SOIA), RO-ESC-IF-5005/3-, 31 Jan 2006.
AD 03 Command Request Interface Document (CRID), RO-ESC-IF-5004/C2, 21 Feb 2006.
AD 04 Data Delivery Interface Document (DDID), RO-ESC-IF-5003/C2, 21 Feb 2006.
AD 05 Experiment Interface Document Part C (EID-C), RO-EST-RS-3001/1.4, 15 Dec 2000.
AD 06 ESA Software Engineering Standards, PSS-05-0, Issue 2, Feb 1991, ESA Board of Software Standardization and Control (BSSC).
AD 07 RSOC Implementation Plan (RSOC IP), RO-EST-PL-3032/1-, 15 Nov 2002.
AD 08 RSOC Design Specification, RO-EST-PL-2010/1-, 20 Oct 2003.
AD 09 PTR Software Specification Document, SOP-RSSD-SP-002/2.12, 22 Jun 2007.
AD 10 Format definition of the Lander Flight Operations Plan, tbd
AD 11 OSIRIS Command Language description, IDA-OCL-0001, Issue 0.7, Jul 2001
AD 12 Experiment Planning System Interface Control Document and File Syntax Definition, SOP-RSSD-IF-001/1.9, 31 Aug 2005.

1.3 Reference Documents

RD 01 Rosetta Project Glossary, RO-EST-LI-5012/2-, 12 Jan 2007.
RD 02 Mission scenarios - Close encounter , RO-EST-TN-3027/D7, 21 Mar 2000.
RD 03 EPS Software User Manual, SOP-SSD-UM-001/1b, 07 Apr 2003.
RD 04 ECSS-40, Software Standard
RD 05 deleted
RD 06 RMOC Mission Planning Concept, RO-ESC-TN-5601/D1, March 1998
RD 07 Rosetta System Database Naming Convention, RO-ALS-TN-4002/4-, May 2000
RD 08 CCSDS Time Code Formats, CCSDS 301.0-B-2 Blue Book, Issue 2, Apr 1990
RD 09 Ground Segment System Test Plan (GSSTP), RO-ESC-PL-5102/1.0, 30 Nov 2000

RD 10 Rosetta FOP Production Plan (FOPPP), RO-ESC-PL-5107/2-, 31 Jan 2002.
RD 11 RLGS/RGS Interface Requirements Document, RLGS-EIF-RLGS/RGS-TECH-6-CNES, Issue 1.10, 25 Jul 2001
RD 12 Empty form sheet for Database Change Request, RO-EST-FO-0012/1-, 23 Dec 2003.
RD 13 Empty form sheet for FOP Change Request, RO-EST-FO-0013/7-, 23 Mar 2007.
RD 14 Empty form sheet for OBCP Requirements Document Change Request, RO-EST-FO-0015/1-, 06 Jan 2004.
RD 15 RSOC System Test Plan, RO-EST-PL-5013/1.0, 01 Jun 2002.
RD 16 Master Science Plan for the Mars Swingby, RO-EST-PL-3426/1c, 26 Jan 2007.
RD 17 Template for Observation Request, `OBR__PInRSO_D_SCEN_IINN_TEMPLATE_V0005.doc` (available via Livelink at 'RSOC Documents/Templates (TPL)'

1.4 Naming conventions

The following naming conventions are used throughout this document:

- Field names are written in typeface Courier and in brackets, *e.g.* "`<start time>`".
- Keywords that must appear as they are written are given in typeface Courier, *e.g.* "`INERT`".
- A "`|`" is used to indicate an exclusive or, *i.e.* `<start time | event>` indicates that the field name is either "`start time`" or "`event`".
- In the file examples, the column numbers are given on top of the example. These are *not* part of the actual file.
- Whenever the term "Experimenter" is mentioned, the orbiter PI teams plus the Lander Lead Scientists are meant.

2. MANAGEMENT

2.1 Overall Management

The Rosetta Project Scientist is responsible for Rosetta Science Operations. He/she is the formal interface for all science-related matters, which includes pre/post-launch science planning and the provision of all science operations inputs. A team of people as described in AD 08 aids him/her. This team forms the Science Operations Team (SOT), also called RSOC.

It is the responsibility of the Experimenter teams to provide the necessary information to allow the SOT to perform the science operations planning.

2.2 Communications and security

2.2.1 Network interface

All file exchange from the Experimenter teams to the RSOC will be done via the computer 'rofts' which is physically located at ESOC in Darmstadt. The File Transfer System (FTS) will redirect all files for the RSOC to a machine physically located at ESTEC in the Netherlands (and after reinstallation of the hardware to ESAC in Spain). Figure 1 shows the setup of the physical interfaces.

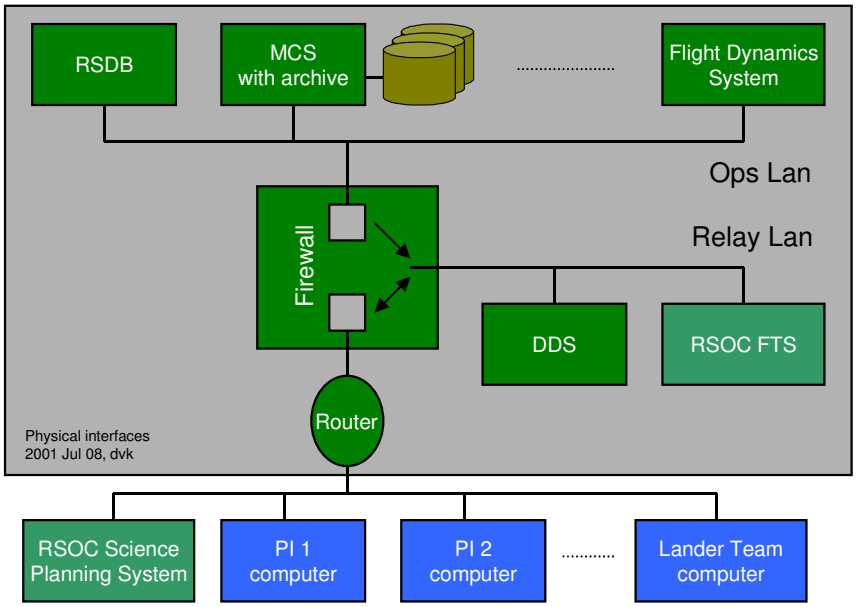

Figure 1: Physical interfaces between Experimenter team computers and the RSOC.

The network protocol supported by RSOC shall be TCP/IP. All network interactions between RSOC and Experimenter teams shall therefore use TCP/IP applications. For file transfer, FTP shall be used.

The Experimenter teams shall access the DDS or the RSOC computers at ESTEC via the public Internet. Thus secure applications shall be used wherever practicable. The detailed communication requirements to access the DDS are laid down in the DDID, Appendix L (RD4).

To ensure the security of the RSOC computers, network access by Experimenter teams shall be permitted only from internet addresses notified to RSOC by the Experimenter teams. They shall be any addresses regularly used for access to RSOC, e.g. computers at the Experimenter's home institute, EGSEs at ESOC or computers at other institutes from where the Experimenters may wish to access RSOC. If an Experimenter wishes to add, change or delete items in the list of internet addresses allowed to access RSOC, he or she shall notify RSOC formally by Email or fax as shown in Section 2.2.1.8. RSOC shall verify the requested changes and then implement them as soon as possible.

During co-location at ESOC in Darmstadt, the Experimenter team computers will be located at the Relay LAN. Note that the Lander will have its main computers at the LCC in Cologne, Germany. They will have computer(s) at ESOC which act as a client to the LCC computers.

2.2.1.1 Overview over the way experimenter input is handled

The files provided by the experimenter teams are transferred to the RSOC via ftp. The detailed procedure is described in the following Section. This Section summarizes the process and explains what happens “behind the scenes”.

The experimenter team ftp-s the file(s) to a machine called ‘rodds’, physically located at ESOC in Darmstadt. This is the same server that is used for the distribution of Rosetta data to the teams via the Data Distribution System (DDS). Note however that the PI teams have two different passwords, depending on whether they send input to RSOC or want to retrieve data from the DDS.

All files that are ftp-ed to the directory “requests_to_RSOC” and have the ending *.ROS in capital letters as described in the following section are picked up by a daemon called FTS (File Transfer System). They are tar-ed into a file with the name still indicating the source PI (“PIx”) and the extension .ROS. They are then transferred to the RSOC computer called ‘rofts’ and put into a directory `/home/ftsops/FTS/RSO/target`. The FTS starts the Operational Request File Acknowledger (ORF-A) which performs the following actions:

(a) untar the file
(b) perform a file name check. If the name is wrong, the file is discarded.
(c) If the file name was ok, for certain file types (*e.g.* OIOR files in ITL syntax) the syntax and database consistency of the file is checked. If there is an error in the contents, the file is moved to a directory called `/var/orfa/database/incorrectDIR`. If the file is ok, it is moved to `/var/orfa/database/correctDIR`.
(d) The file is sent via ftp to the RSOC machine ‘redstar’, physically located at ESTEC.
(e) An acknowledgement file is sent to the sender, reporting about the correctness of filename and file itself.
(f) The same acknowledgement file is also copied to ‘redstar’.

During nominal operations, the RSOC team will check at the end of a planning deadline which new files are available and process them. During tests, the RSOC team can use the RSOCWeb (at http://www.rssd.esa.int/rosetta) to regularly check for new incoming files. The Log Viewer will display the log file created by ORF-A using a web-based interface. The File Tracker will give access to the submitted file, the acknowledgement and the log file. If unexpected files are submitted from the PI teams to RSOC, an informational message should be sent to RSOC personnel.

Depending on which file type was sent different actions will be performed at RSOC. If the file was an OIOR file, the RSOC can use it for preparing a consolidated operational plan, *etc*.

2.2.1.2 Basic definitions

2.2.1.2.1 Flight Control Procedures and Command Sequences

As the connection between FCPs and Command Sequences may not be always clear, it is summarized in the following.

The Flight Operations Plan (FOP) is a document containing all procedures required to perform the mission. These procedures are containers of command sequences. The command sequences (CS) and telecommands (TC) are stored in the Rosetta Mission Implementation Base (RMIB) which is an electronic output of the FOP.

The payload procedures and sequences that are used repetitively throughout the mission, are contained in the payload procedures volumes in the FOP Volume 5. Updates are requested by the PI teams (often after iteration with RMOC and / or RSOC), processed by RSOC and implemented by RMOC.

There are three types of procedures:

1. FCP: Payload activities can normally be expressed in terms of steps involving the execution of a set of telecommands, payload status check in telemetry, the verification of successful execution of the telecommands, the logging of the activity and related data collection / analysis activities. All this is described in a Flight Control Procedure (FCP).

2. SEQ: Activities consisting only of delta-timed commands without monitoring steps are documented under command SEQuences procedures (SEQ).

3. CRP: An activity dealing with contingency recovery is documented in Contingency Recovery Procedures (CRP).

Each sequence within a procedure is associated with a SOC flag which indicates whether the sequence is authorised for scheduling via OIOR / LOR / POR. The SOC flag is documented in the FOP Volume 6.08 and in the RMIB. Only sequences with a SOC flag YES are extracted from the RMIB at RSOC and included in the sequences EDFs. The SOC flag is independent of the type of procedure to which the sequence belongs. This means that a FCP sequence can be allowed in an OIOR / LOR / POR and in this case will be executed

without the interactive steps. It is recommended that all sequences within the same procedure have the same SOC flag.

Naming convention:

Procedures: EX-TYP-nnn, where

EX is the 2-letter experiment abbreviation according to Table 11

TYP is the type FCP, SEQ or CRP

nnn is a 3-digit number

Sequences: AEXTnnnL, where

EX is the 2-letter experiment abbreviation according to Table 11

T is the type F, S or C

nnn is a 3-digit number

L is a letter, i.e. A, B, C, ...

Examples:

The FCP procedure VR-FCP-017 contains the three sequences AVRF017A, AVRF017B and AVRF017C.

The SEQ procedure MR-SEQ-614 contains the single sequence AMRS614A.

2.2.1.2.2 Data volume unit naming conventions

Note that the terms MegaByte (MByte) and MebiByte (MiB) correspond to 2^{20} Bytes (1024 x 1024 Bytes).

2.2.1.3 Inputs from Experimenter teams

Electronic inputs from Experimenter teams, *e.g.* experiment software patches, shall be sent as computer files using the FTP application to the RSOC FTS computer.

Use the following procedure:

```
ftp rodds.esa.int
username <press enter>
password <press enter>
cd requests_to_RSOC
ascii (or bin if zip files are transferred)
put filename.ROS filename.TMP
rename filename.TMP filename.ROS
quit
```

filename shall follow the FTS convention

```
ffff_sordes_txxxxxxxxxxxxxx_vvvvv.ROS
```

The *username* is the name of the experiment as defined in Table 3, but in small letters. The passwords are distributed by secure means (*e.g.* personal communication).

Note 1: To ensure that input files are not corrupted during transfer, before using 'put', the command '`ascii`' or '`bin`' has to be executed, depending on whether ASCII files (*e.g.* OIOR or CS_P files) are transferred or binary files (*e.g.* zip files like CS_D).

Note 2: The reason for putting a *.TMP file first and renaming it is the following: On the receiving computer, a polling task is running that checks for new files with the extension 'ROS' (must be in capitals!). Thus, if a long file is sent via ftp, and the polling tasks happens to take the file in the middle of a transfer, corrupted files may result. First putting a temporary filename and then saying 'rename' guarantees that only after the complete file has arrived on the rodds machine they can be polled. The filename extension TMP has been chosen for obvious reasons but any filename extension can be used for the above purpose apart from ROS.

The name of the file shall identify its contents; the naming scheme for each class of input shall be defined in the appropriate Section of this Interface Control Document (ICD).

All input files shall be ASCII, Word, Excel, or pdf files. Pdf inputs shall conform to the recommendations laid down within CSDS.

ASCII input files shall not contain tab characters. The implementation of tabs varies between different computers, so tabs cannot be used to simulate the fixed format. Files containing tabs shall be rejected as invalid.

Word and Excel files shall be zipped before submission. Filename of the zip file and its contents shall be identical. Each file shall be zipped separately i.e. only one source file per zip file.

The security of this input process will rely on the proper and careful use of the passwords which give write access to the ftp server. Thus RSOC shall enforce the following standards:

- password size
- password content
- regular updating
- account locking on error counts > 3

The Experimenter teams shall be in charge of updating their passwords. However, RSOC operations staff may update them, if requested by Experimenter teams. The updated password shall be sent to the team by secure means (*e.g.* personal communication).

In case three erroneous accesses occur, the Spacecraft Operations Manger (SOM) at ESOC shall be contacted by telephone to reset the account.

2.2.1.4 Handling erroneous file submissions

In the case where an erroneous input file remains in 'requests_to_RSOC' on rofts and has been detected before renaming the PI shall remove the file by renaming it to 'badfile.ROS'. The erroneous file will then be submitted, rejected and discarded as nominal.

2.2.1.5 Checking, performance, response time

In the short-term planning cycle, there will be deadlines for the operational request files, *e.g.* every last Friday of the month at 12h00m UT (*tbc*). The operational request files are called Orbiter Instrument Operational Request (OIOR) and Lander Operational Request (LOR) file. The syntax of these files can be either the POR syntax (POR = Payload Operational Request), see Section 3.2.1.3.3, or the ITL syntax (Input Timeline), see Section 3.2.1.3.5.

Upon receipt of a file, the RSOC will perform a syntax and database consistency check on the file. After having performed this check, a *receipt acknowledge* will be returned. If the contents check was not successful, an error report will be provided. The contents check and the receipt acknowledge will be performed by a software tool, the Operational Request File Acknowledger (ORF-A), which will run on the RSOC FTS computer.

Even though the RSOC can handle several arriving files simultaneously, it is required that the Experimenter teams only send another file after they have received a receipt acknowledge of the file that was sent previously. Otherwise, correct versioning cannot be ensured. Note that in the regular short-term planning process, it is expected that the Experimenter sends one and only one OIOR/LOR file or PTR file per planning cycle (covering typically one week). He/she has to send this file until a given deadline (see AD 08, p. 7, for the deadlines). The latest available file of one type will be used for the planning.

The validity of the content of the file can in some cases only be confirmed after more processing has been done, *e.g.* accepting an OIOR file is only possible after it has been cross-checked that no conflicts with other OIORs occur. This, necessarily, needs more time, and will be done after the inputs from all Experimenter teams have been received, *i.e.* after the passing of the deadline for the respective planning cycle.

When it is done, a *file acceptance report* will be returned. Especially in the case that the file was not accepted, an error or conflict report will be provided (*e.g.* the CONF file for an OIOR or LOR).

The confirmation will be done by a ftp put to the computer of the experimenter. The server addresses need to be specified in this document (see Appendix B).

The response times of the RSOC (only) for different mission phases is given in Table 1. "Emergency cases" are defined as cases where the s/c and/or payload safety might be endangered. In these cases, it is possible to circumvent the normal planning process to decrease the response time.

Table 1: Maximum response times for file acknowledge and acceptance from RSOC (only).

	Commissioning	Cruise	Nominal science	Emergency cases
Receipt acknowledge	5 min	5 min	5 min	not applicable
File acceptance report	1 day after file receipt	1 week after file receipt	2 days after planning deadline	5 min after receipt

2.2.1.6 Outputs from RSOC

Currently, the main entry point for data distribution by the RSOC is the RSOCWeb at

http://www.rssd.esa.int/rosetta

Documents are available from the RSOC documentation server, at the web site

http://www.rssd.esa.int/livelink/

This page is password protected. User names and passwords shall be distributed by secure means, *i.e.* personal communication. An automatic notification system for updates is available, see the online documentation.

After the DDS is fully operational, all outgoing information from the RMOC as described in AD 04 (Data Delivery Interface Document, DDID) and from the RSOC as described in this document will be available via the DDS.

All output files shall be ASCII files with variable record length. For documents, the file format will be Microsoft Word files or (preferred) Portable Document Files.

2.2.1.7 Access to input and output directories

The access modes of the incoming/outgoing directories will be restricted by passwords, see previous Section.

2.2.1.8 Electronic mail

Any messages to RSOC that are not part of the nominal planning process shall be sent to:

rsoc@rssd.esa.int

2.2.2 Mailing address

All mail for the RSOC shall be sent to the Rosetta Science Operations Manager with copy to the RSOC team including the Project Scientist. The current mail address is:

Rosetta Science Operations Centre
ESA/ESTEC, SCI-OS
Keplerlaan 1, NL-2201 AZ Noordwijk ZH

(Note: Postal address will change at the end of 2007 to ESAC in Spain)

Contact per email: rsoc@rssd.esa.int

2.2.3 Fax & telephone

Fax: +31-71-565-4692
Phone: +31-71-565-3192 (Kristin Wirth, Science Operations Manager)
+31-71-565-4821 (Rita Schulz, Project Scientist)
+31-71-565-3539 (Gerhard Schwehm, Mission Manager)

2.3 Handling of computer downtimes

All data exchange will be performed via the DDS, which features a cold redundant computer setup maintained by the RMOC at ESOC. The computer system will be monitored 24 hours a day, 7 days a week. If the RSOC FTS computer crashes, it will be rebooted. If a reboot is not possible, a backup machine will be installed.

It is expected that any unavoidable downtime of the DDS will be announced by ESOC.

RSOC shall report unscheduled downtime on the RSOC computers to the Experimenter teams if this is expected to exceed 4 hours on a working day. These reports will be sent by electronic mail using alternative electronic mail facilities at RSOC location. In the unlikely event that no alternative is available reports will be sent by fax.

2.4 Meetings

The following table gives an overview over the planned meetings concerning science operations. Note that to reduce travel costs, it is foreseen to use modern technology as video conferencing and the web as support media. In particular, for the monthly planning meetings the necessary information will be available on the web so that people can participate via telephone or video and have the documentation (*e.g.* the Science Activity Plan under discussion) available at their location. The short-term planning meeting will be done at a time where it allows the US Co-Is to participate remotely, *e.g.* at 16h ESOC time.

Table 2: Planned meetings with approximate dates.

Name	Purpose	Time
SWT	Normal SWT agenda plus mission scenario definition	Twice per year, during the complete mission
SWT	Final long-term planning meeting, decide final long-term plan	Jun 2012
STPM	Short-term planning meeting - agree to any updates	During science phases: weekly, possibly daily

2.5 Change Control

This document shall be maintained by RSOC under ESA configuration control. Change requests should be sent to RSOC. RSOC will assess the impact of the change together with the proposer. When this assessment is complete, RSOC will circulate a formal change request. If the request is agreed, RSOC will update this ICD and make the new version available on the RSOC documentation server.

3. INTERFACE DESCRIPTION

A general description of the planning process for Rosetta is given in AD8. Here, we summarize the interfaces of the RSOC, since a part of these is the topic of this document. The most complex scenario is during the comet observation phase, which is described here. Most of the files and procedures will already be used during the cruise phases and asteroid flybys, pre-validated procedures will be used. Note that the technical definition to the interfaces is identical to those described here, even if the planning process itself is easier.

One of the tasks of the Rosetta Science Operations Centre (RSOC) is to consolidate the operational requests by the Experimenter teams. These will send their operational requests by electronic files called Orbiter Instrument Operational Requests (OIORs) and Lander Operations Requests (LORs) to the RSOC. After conflict resolution between the payload experiments (which might require iterations with the

Experimenter teams and the RMOC), the RSOC will generate a Payload Operation Request (POR) file in the format described in AD3.

In addition, the Experimenter teams will request attitudes and trajectories, which again will be consolidated by the RSOC and only then be forwarded to the RMOC.

In return, the RSOC will provide the Conflict File (CONF) generated by the planning software used at the RSOC for information of the Experimenter teams. After the consolidation and resolution of all conflicts, RSOC will provide

(a) a Science Activity Plan (SAP) after each long-term planning process, which is a listing of mission scenarios;

(b) a Master Science Plan (MSP) for each mission scenario, which goes into more detail. *E.g.* it will list the experiment operations at least down to mode level and include critical mission events as well as the planned pointing;

(c) the final, consolidated POR file whenever it is forwarded to the RMOC.

To ease the planning process within the Experimenter teams especially in the early phases of the project, the RSOC will also provide so-called "reference" information:

(d) a reference comet, giving some design values for the comet parameters;

(e) a reference attitude file, typically one per mission scenario;

(f) a reference trajectory file, typically one per mission scenario.

The purpose of this document is to define, down to the detailed level of file formats, the interfaces between the RSOC and the Experimenter teams. The interface between RMOC and Experimenter teams is described in AD4 (DDID).

3.1 General file naming conventions

All filenames are based on a convention given in AD3 (CRID). The general format for a file name is

```
ffff_sordes_txxxxxxxxxxxxxx_vvvvv.ROS
```

The complete filename shall be in capital letters only, where

`ffff` is the file type identifier, permitted values are:

`ACKN`	Acknowledge file
`CONF`	Conflict file
`CS_D`	Command Sequence Update - FOP Change Request
`CS_P`	Command Sequence Update - EDF fragment
`DVP_`	Data Volume Profile Update
`ECF_`	Expedite Command File
`ECFP`	Expedite Command File - Experimenter input
`LOP_`	Lander Flight Operations Plan
`LOR_`	Lander Operations Request
`MCR_`	Memory Checksum Request
`MCRP`	Memory Checksum Request - Experimenter input
`MDR_`	Memory Dump Request
`MDRP`	Memory Dump Request - Experimenter input
`MPR_`	Memory Patch Request
`MPRP`	Memory Patch Request - Experimenter input
`MSP_`	Master Science Plan
`OIOR`	Orbiter Instrument Operations Request
`OIPR`	Orbiter/Lander Instrument Pointing Request
`PORP`	Payload Operations Request - Preliminary planning file

POR_	Payload Operations Request
PP__	Power Profile Update
PTR_	Pointing Request
PTRP	Pointing Request - Preliminary planning file
RPI_	Reference Pointing Information
RTI_	Reference Trajectory Information
RFDE	Reference Flight Dynamics Events
UDP_	User Defined Procedure model from OSIRIS

sor is the source mnemonic, *i.e.* the mnemonic identifying the node from which the file originates. The permitted source mnemonics are:

PIn	Rosetta Principle Investigators (PIs) and Lander, with the value n assigned as in Table 3.
RSO	Rosetta Science Operations Centre (RSOC)

Table 3: Experiments and code for file names.

Experiment	n	sor	Experiment	n	sor
ALICE	1	PI1	ROSINA	8	PI8
CONSERT	3	PI3	RPC	9	PI9
COSIMA	4	PI4	RSI	F	PIF
MIDAS	5	PI5	SREM	G	PIG
MIRO	6	PI6	GIADA	H	PIH
OSIRIS	7	PI7	VIRTIS	I	PII
			LANDER	L	PIL

des is the destination mnemonic, *i.e.* the mnemonic identifying the node to which the file is being sent. In the context of this ICD, the following destinations are foreseen:

PIn	The computer of a specific Experimenter team, with n as defined in Table 3
RMX	The RMOC computers RMA and RMB
RSO	The RSOC primary computer

t is the data type identifier. Currently, only one data type is foreseen, namely

D	indicates that the file contains data.

xxxxxxxxxxxxxx is a file specific field (14 characters long). Currently, two formats are supported.

(a) If the file is an OIOR, LOR, or PTR file, it shall follow the following convention:

_pppp_ii_xxxxx

where

pppp	is the planning cycle identifier. It shall contain a four-digit number (preceding zeros if required) denoting the planning cycle for which the file is intended. It is the responsibility of the RSOC to precisely define the time range for each planning cycle (In case of Mars Express, the orbit number will be given here).
ii	is the experiment identifier. Use the two-digit code given in Table 11. This field is redundant to 'sor' kept in to be compatible with Mars Express.
xxxxx	is a file specific field which can be used freely. Fill it with the underscore character in case of doubt. It allows giving a descriptive name to the file (must be 5 characters long). Use capital letters only.

(b) If the file is an ACKN file, it shall contain an underscore as the first character, followed by four characters representing the file type of the file that it is an acknowledgement to, followed by an underscore, followed by a five-digit number (preceding zeros if required) denoting the version number of the file that it is an acknowledgement to, followed by an underscore, followed by a two-digit number (again with preceding zeros if necessary) representing the ORFA-defined error number.

(c) If the file is an MCRP, MDRP or MPRP file, it shall follow the following convention:

xxxxxxx_____

where

xxxxxxx is a file specific field which can be used freely. Fill it with the underscore character in case of doubt. It allows giving a descriptive name to the file (must be 7 characters long). Use capital letters, digits and underscores only.

(d) If the file is an MCR_, MDR_ or MPR_ file (produced by RSOC when forwarding the MCRP, MDRP or MPRP file received from the PI team to RMOC), it shall follow the following convention:

xxxxxxxiivvvvv

where

xxxxxxx is copied from the corresponding MCRP, MDRP or MPRP file.
ii is the experiment identifier. Use the two-digit code given in Table 15.
vvvvv is the submission number of the corresponding MCRP, MDRP or MPRP file.

`vvvvv` is the sequence number which starts at `00001` and increments for each `ffff_sordes` (with wraparound at `99999`).

Sequence numbers shall be allocated following rules specified below:

For each new successful input file submission the associated sequence number found in the filename (Section 3.1) shall increment by one.

If the new input file submission fails a) due to wrong file name b) due to error found in the contents, the file shall be re-submitted with the same sequence number.

If the input file fails due to a wrong sequence number the file shall be re-submitted with a corrected sequence number.

Some files shall be accompanied by DCR forms of the input file type: 'xxxD'. The input file of type 'xxxP' and its accompanying input file of type 'xxxD' shall have identical sequence numbers. This allows a link between files. The following rules apply for this input file pair:

If either input file of the pair fails submission then the standard rules apply.

After successful submission the input file pair should have been submitted with identical sequence number. If this is not the case then contact rsoc (section 2.2.1.6).

If one or both of the input file pair is rejected by RSOC after investigation and resubmission is required, both input files shall be resubmitted to ensure the sequence number link.

3.2 Interfaces concerning the timeline planning

3.2.1 Information from the Experimenter teams to RSOC

3.2.1.1 Trajectory requests (TRR)

The trajectory requests will be given to the RSOC in form of email communication to the Project Scientist or as minuted during operational planning meetings.

3.2.1.2 Orbiter/Lander Instrument Pointing Requests (OIPR)

3.2.1.2.1 Description

This will be a request file giving time and pointing mode, *e.g.* NADIR means pointing to nadir. Some of the modes need parameters, these are currently being discussed with the RMOC and will be updated in a future update of this document.

3.2.1.2.2 File naming convention

The file naming convention shall follow the description given in Section 3.1, with the file type identifier `ffff` being "`OIPR`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`". The RSOC will combine the inputs from the Experimenters to a file with the file type identifier "`PTRP`", which will be given to the Flight Dynamics team of ESOC for the preliminary planning. It will also be available to the PI teams on the DDS. The final confirmed Pointing Request File will be of type "`PTR_`".

3.2.1.2.3 File format

The file shall be an ASCII file. Each line shall have a maximum number of 128 characters, including a line feed (<LF> or ASCII character 10 decimal). Each file shall follow the definition given in AD 09, Section 4. The date and time of creation and an author shall be given as a comment in the beginning of the file.

3.2.1.2.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
# This is an example of a Pointing Request file
# Created 2001 Sep 10, 10:11:12 UTC, dvk

AT_PERICENTER    -00:01:30     OSIRIS     INERT_START (RA = 15.75 DEC = -37.60)
000_01:00:00                   OSIRIS     INERT (OBJECT = SUN)
000_01:01:00                   OSIRIS     INERT (OBJECT = SIRIUS, \
                                                 POINTING_AXIS = X, \
                                                 SLEW_POLICY = SMOOTH)
000_02:20:30                   OSIRIS     NADIR
000_03:21:10                   OSIRIS     NADIR (ROLL_MODE + ROLL_FIXED)
#-------------------------------------------------------------------------------
```

3.2.1.3 Orbiter Instrument Operational Requests (OIOR)

3.2.1.3.1 Description

The OIOR file is the main means of the orbiter PI teams to communicate their operational requests to the RSOC. Two formats will be supported:

(a) A format that contains the syntax of the POR files, but with (minor) additional capabilities to make the science planning process easier. (see open item no. 7 – this option will be suggested to be removed via a DCR in the next update of the document).

(b) A format called ITL (Input Timeline), which is a more readable version of the POR syntax in columnar structure.

A thoroughly tested and verified converting routine is available as part of the EPS software. It is available via the Livelink server as described in Section 2.2.1.6.

Note: Both the OIOR and the LOR file are called Operational Request Files (ORF).

3.2.1.3.2 File naming convention

The file naming convention shall follow the description given in Section 3.1, with the file type identifier `ffff` being "OIOR", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "RSO".

3.2.1.3.3 File format for OIOR file similar to POR syntax

NOTE: A DCR will be generated requesting to remove this paragraph from the next issue of the document.

The file shall be an ASCII file. The syntax shall follow the description in AD3 (CRID), Section 7.1. In addition, the keyword "`Include`" as defined in Table 4 is allowed at any line.

The "delete" functionality of the POR syntax as defined in the CRID will *not* be supported in the nominal short-term planning process. This is to facilitate the correct versioning of the OIOR/LOR files (This means that to completely cancel a command request file, a new file with empty contents needs to be sent).

Table 4: Including files in the OIOR file in addition to the definition in AD3.

Field name	Column	Format	Comments
`<Start_time | Event_label>`	1	20X	CCSDS format time (YY-DDDThh:mm:ssZ) or ITL format time ([±][DDD_]hh:mm:ss) If both start and end time are given, the start time is the first allowed time for the execution of the command. Or event label as defined in AD4, annex H.
`<End_time | Delta_time>` `optional field!`	2	20X	`End_time` is the end time in CCSDS format time (YY-DDDThh:mm:ssZ) or in ITL time syntax ([±][DDD_]hh:mm:ss) If both start and end time are given, the end time is the last allowed time for the execution of the command. `Delta_time` is in the format `[±][DDD_]hh:mm:ss` where: `DDD` is the number of days in the range 000 to 999; `hh` is the number of hours in the range 00 to 23; `mm` is the number of minutes in the range 00 to 59; `ss` is the number of seconds in the range 00 to 59; Leading zeros must always be inserted to ensure that the field is 3/2 digits long;
`<Exp_label>` *`optional field!`*	3		Name of the experiment from column 1 of Table 3 (optional)
`Include`	4	7X + blank	keyword to indicate an include file
`<file_name>`	5	39X	name of file to be included according to definition in Section 3.1, enclosed in quotes..

3.2.1.3.4 Example

For an example of the regular POR syntax, see AD3 (CRID). An example for a line with the keyword `Include_file` is given here:

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
C-------------------------------------------------------------------------------
C This is an example of a line defining to include a file with
C the name tag "IMAGE".

13-113T20:24:00Z      OSIRIS   Include "POR__PI1RSO_D_0000_SR_IMAGE_00010.ROS"
C-------------------------------------------------------------------------------
```

3.2.1.3.5 File format for OIOR file in ITL syntax

The file format of these files shall follow the definition in the EPS ICD (AD 12).

3.2.1.3.6 Example

```
0         1         2         3         4         5         6         7         8
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890
#-------------------------------------------------------------------------------------------
# Example for an ITL file
# Created 2001 Sep 22, 10:00:00 UTC, dvk

13-113T20:15:17Z -                    OSIRIS   NOMINAL    TAKE_IMAGE (01.000)
# Go to MOVIE mode
13-113T20:16:00Z 2013-313T20:17:00Z OSIRIS   NOMINAL    NOMINAL_TO_MOVIE
13-113T20:16:00Z 2013-313T20:17:00Z OSIRIS   MOVIE      TAKE_MOVIE (T_EXP = 10.0, N = 10)
13-113T20:18:00Z                    OSIRIS   Include "POR__PI1RSO_D_0000_SR_IMAGE_00010.ROS"
13-113T20:22:00Z 2013-313T20:23:00Z OSIRIS   MOVIE      TAKE_MOVIE (T_EXP = 20.0, 10)
13-113T20:24:00Z                    OSIRIS   Include "POR__PI1RSO_D_0000_SR_IMAGE_00010.ROS"
#-------------------------------------------------------------------------------------------
```

3.2.1.4 Expedite Command Files (ECFP)

The use of Expedite Command Files is discouraged for Rosetta. If used, see AD3, Section 7.2, for a definition. Note that the file type an Experimenter shall give is "`ECFP`", RSOC will change the type to "`ECF_`".

3.2.1.5 Power Profile updates (PP)

3.2.1.5.1 Description

A telecommand or a telecommand sequence may be a combination of many different actions within the actual instrument. Thus, the power may not be a constant value but might change versus time during the execution of the telecommand. In power-critical phases, the scientific operational planning may have to account for such a detailed power profile. This Section specifies the format to describe the power profile linked to a telecommand or telecommand sequence. Note that as a baseline, an average power will be used in the planning. The RSOC together with the Experimenter team will decide on a case by case basis for which commands a more detailed profile is required.

In the case of a new telecommand sequence, the resource requirements may also be specified in the Command Sequence Update Request, see the relevant section.

3.2.1.5.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`PP__`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`".

3.2.1.5.3 File format

For actions that are critical with respect to resources, the Experimenter teams shall provide one of the following:

(a) A list of "actions", in which the telecommands can be broken down, with associated power values;

(b) a file describing the necessary power of a telecommand as a function of time.;

(c) a file describing the necessary power of a sequence as a function of time.

The file shall be an ASCII file, the first line of which starts with the keyword "`Action: xxx`" where `xxx` is the mnemonics of the telecommand or telecommand sequence as defined in the RMIB. The next lines shall list the power versus time as defined in Table 5. The date and time of creation and an author shall be given as a comment in the beginning of the file.

Comment lines are allowed anywhere in the file. They start with the character "`#`" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

Each column shall be separated by one or more white spaces. Continuation lines can be marked by a "/" at the end of a line.

Table 5: File format for Power Profile changes.

Field name	Column	Format	Comments
`<Relative_time>`	1	20X	Time after which a power change occurs, relative to the beginning of the action. Format [±][DDD_]hh:mm:ss where `DDD` is the number of days in the range 000 to 999; `hh` is the number of hours in the range 00 to 23; `mm` is the number of minutes in the range 00 to 59; `ss` is the number of seconds in the range 00 to 59. Leading zeros must always be inserted to ensure that the field is 3/2 digits long.
`<Power>`	2	20X	In Watt, accuracy ±0.1 W.

3.2.1.5.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
# Example for a power profile change
# Created 2001 Sep 22, 10:00:00 UTC, dvk

Action: ACQUIRE_HISTOGRAM
+000:00:00           2.0
+000:00:02           4.2
+000:00:06           2.0
+000:00:10           0.0
#-------------------------------------------------------------------------------
```

3.2.1.6 Data Volume Profile updates (DVP)

3.2.1.6.1 Description

What was said above for the power is similarly applicable to data volume. Note that the alternative use of "data rate" is still *tbd*.

3.2.1.6.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`DVP_`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "RSO".

3.2.1.6.3 File format

For actions that are critical with respect to resources, the Experimenter teams shall provide one of the following:

(a) a list of "actions", in which the telecommands can be broken down, with associated power values;

(b) a file describing the necessary power of a telecommand as a function of time.;

(c) a file describing the necessary power of a sequence as a function of time.

The file shall be an ASCII file, the first line of which starts with the keyword "`Action: xxx`" where `xxx` is the mnemonics of the telecommand or telecommand sequence as defined in the RMIB. The next lines shall list the power versus time as defined in Table 6. The date and time of creation and an author shall be given as a comment in the beginning of the file.

Comment lines are allowed anywhere in the file. They start with the character "`#`" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

Each column shall be separated by one or more white spaces. Continuation lines can be marked by a "/" at the end of a line.

Table 6: File format for Data Volume Profile changes.

Field name	Column	Format	Comments
`<Relative_time>`	1	20X	Time after which a data volume change occurs, relative to the beginning of the telecommand or telecommand sequence. Format [±]`[DDD_]hh:mm:ss` where `DDD` is the number of days in the range 000 to 999; `hh` is the number of hours in the range 00 to 23; `mm` is the number of minutes in the range 00 to 59; `ss` is the number of seconds in the range 00 to 59. Leading zeros must always be inserted to ensure that the field is 43/2 digits long.
`<Data volume>`	2	20X	Data volume in kbit (*tbc*) Note: The alternative use of data rate is still *tbd*.

3.2.1.6.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
# Example for a data volume profile change
# Created 2001 Sep 22, 10:00:00 UTC, dvk

Action: ACQUIRE_HISTOGRAM
+000:00:00           0
+000:00:05           1024
+000:01:05           1024
+000:02:05           1024
#-------------------------------------------------------------------------------
```

3.2.1.7 Observation Requests (OBR)

3.2.1.7.1 Description

An observation request is the first input from the experiment team to RSOC. It is currently in use during the cruise phase planning and consists of a Word template which has to be filled out by the teams. The items which are requested from the experimenter teams are:

- Description of the observation
- Science, calibration or checkout objectives
- Duration
- Is the observation to be done interactively, what are the monitoring requirements
- Required pointing, boresight and target
- Power and data volume estimates
- Science and special operational constraints, required services
- Operations overview

A more detailed description on how to fill out the template can be found in Appendix I.

3.2.1.7.2 File naming convention

The file naming convention shall be closely related to the file naming convention prescribed by the CRID and DDID and be as follows:

`OBR__PInRSO_D_SCEN_IInn_<SHORT_NAME>_Vnnnn.doc`

Where

`OBR_` is the file type identifier;

`PIn` is the abbreviation for the institute as defined in Table 3;

`RSO` is the destination identifier and shall always be `RSO` for RSOC;

`D` indicates that the file contains data (to stay compatible with the DDID/CRID convention);

`SCEN` is a short code for the mission scenario. The following values are possible: `ESB2` = Earth Swingby 2, `ESB3` = Earth Swingby 3, `PCnn` = Payload Checkout number *nn* (with leading zeros), `STEI` = Steins flyby, `LUTE` = Lutetia flyby, STD_ for 'standard' OBRs which are not linked to any specific mission scenario. Additional acronyms may be invented for additionally appearing cruise science opportunities.

Note that these scenarios are not necessarily equal to the mission phase, thus, different ackronyms will be used. For example, in the Earth Swingby 2 phase (abbreviated EAR2) there can be a payload checkout (scenario code PC06) and the actual swingby operations.

`ii` is the two-letter abbreviation of the instrument according to Table 11;

`nn` is the number of the observation request, with preceding zeros. If the observation needs to be split into several pieces, a letter shall be inserted after the number, *e.g.* 'VR02A'.

<SHORT_NAME> is a free field which can be used for giving a short name to the observation (field length is not fixed);

Vnnnn: *V* indicates that the following number is a version number (rather than the sequence number as used in the CRID/DDID convention, nnnn is a version number with preceding zeros.

3.2.1.7.3 File format

The file shall be a word document based on the template OBR__PInRSO_D_SCEN_IINN_TEMPLATE_V0005.doc which can be found in the Rosetta document repository under 'templates'. Always the latest version shall be used.

3.2.1.7.4 Example

An example for the file name:

OBR__PI4RSO_D_ESB2_SR01_MOON_STARE_V0001.doc

For a filled-out example, check the Livelink repository under

Operational_Scenarios/Mars_Swing-By/PI_inputs/Observation_Requests_(OBR)/.

3.2.1.8 User Defined Procedure (UDPs) of OSIRIS

3.2.1.8.1 Description

The Experiment OSIRIS is commanded via so-called User Defined Procedures (UDPs). Updating UDPs is similar to memory maintenance and will be handled as follows:

A new UDP shall be defined and documented via a document change request (DCR) to the OSIRIS User Manual. The DCR shall contain, as an appendix, the source code listing of the UDP. In the header of the UDP, between comment characters, shall be a description of the UDP in the syntax of the Experiment Description File (EDF), 'action', as defined in the EPS ICD (AD 12). The source of the UDP file shall also be passed to the RSOC as an electronic file (via ftp to the DDS, as described in Section 2.2.1.1). The RSOC shall ingest the UDP into the Experiment Description File for OSIRIS.

Once the change request is accepted, the compiled version of the UDP shall be passed to the s/c via the Service 6 command (see Section 3.4.3.1).

Each UDP shall have a unique ID number which is at any time known to the OSIRIS team, to the RSOC, and the RMOC.

The UDP can be called by a telecommand sequence which is available in the RMIB (the "UDP Manager"). The name of the UDP, a user tag, number of parameters, and the parameters itself can be passed to this telecommand sequence.

3.2.1.8.2 File naming convention

The file naming convention shall follow the description given in Section 3.1 with the file type identifier ffff being "UDP_", the source sor is "PIn" as defined in Table 3, the destination des is "RSO".

3.2.1.8.3 File format

Two files shall be provided:

(a) An ASCII file with the source code of the UDP, in a format as defined in AD11. In the header of the source code, a description of the code in the EDF syntax shall be given, this syntax is described in in the EPS ICD (AD 12).
(b) The actual byte code of the UDP shall be provided as a Service 6 command, see Section 3.4.3.1.

The date and time of creation and an author shall be given as a comment in the beginning of the file.

3.2.1.8.4 Example of the UDP source code

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345
//-----------------------------------------------------------------------------
// This is an example of an OSIRIS UDP file
//
// Author: nt
// Date: 2001 Sep 22, 10:00:00 UTC

/* File description in EDF syntax

Action: nt_nac_shutter_power_on
Action_parameters: CAM
Run_type: ABSOLUTE
Run_actions:  00:00:00 PowerShutterOn (CAM)
              00:01:00 sleep (sleeptime = 2000)

# NOTE: Assumes that 'PowerShutterOn' and 'sleep' are defined in the
# OSIRIS EDF

*/
// Here starts the OSIRIS UDP

#include "OsirisLib.h"

void nt_nac_shutter_power_on()
{
UNS32 cam;

  cam=NAC;
  PowerShutterOn(cam);
  sleep(2000);
}
//END
#-----------------------------------------------------------------------------
```

3.2.1.8.5 Example of the Service 6 command

tbd

3.2.1.9 RSI-specific interface to the RSOC

3.2.1.9.1 Description

RSI will have requirements concerning the configuration of the on-board Telemetry and Command subsystem and the ground station RSI IFMS (called IFMS_RS). These shall be transferred to the RSOC in a syntax compatible with the Experiment Planning System (ITL syntax). The RSOC shall forward these requests within a Pointing Request File (PTR) to the RMOC, to ensure that they do *not* enter the scheduler, but are treated manually. Therefore, they are also expected from RSI as Pointing Request files (type 'OIPR').

NOTE: In Issue 1/b, the details of this interface are being re-discussed. They were covered by RO-EST-IF-5010-DCR-017, which is still open. The intention is to close this DCR in release 1/c.

3.2.1.9.2 File naming convention

The file naming convention follows the description given in Section 3, with the file type identifier `ffff` being "`OIPR`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`".

3.2.1.9.3 File format

The file shall be an ASCII file. Each line shall have a maximum of 128 characters, including a line feed (<LF> or ASCII character 10 decimal).
Comment lines are allowed anywhere in the file. They start with the character "#" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

3.2.1.9.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
# Example file for RSI requests, 26-Sep 2002
# execute a few operations (for EPS tests only):
# bring the USO up, switch do ONES-mode,
# configure IFMS B, etc...

PER_AOS_10    RSI    DEFAULT       USO_UP          # toggle Uplinkdownlink coherency
00:30:00      RSI    DEFAULT       COHERENCY_OFF   # ...

# request telemetry modulation off
00:35:00      RSI    ONEWAY        TM_OFF          # ...

# request IFMS configuration
00:50:00      RSI    ONEWAY       IFMS_B_Configure (\
                                                    UL=X \
                                                    DL=X_CL)
# ... change onboard frequency reference source
01:00:00      RSI    DEFAULT      USO_ACT

# request simultaneous Doppler and Range
01:30:00      RSI    TWOWAY       TRACKMODE (TRKMOD = DOP_RNG)
# ...

# point HGA to Earth
01:40:00      PTR    NADIR ( \
                          OBJECT_TO_BE_POINTED = HGA \
                          OBJECT = EARTH)
#-------------------------------------------------------------------------------
```

3.2.2 Lander-specific interfaces to the RSOC

3.2.2.1 General remarks

Formally, the operations of the Lander will be communicated to ESA via the LOR file. However, the LOR file is too complex to allow science planning directly. Therefore, the Lander team will provide the "Lander Operations Plan (LOP)" to the RSOC in parallel with the LOR file. The LOP is a human-readable version of the LOR. The LOP will be converted by the Lander Ground Segment to ITL syntax.

An overview over the Lander planning process and the interface to the RSOC is given in AD 08. The Lander team shall take into account the RSOC constraints in the elaboration of their Experiment Operations Plan (EOP).

3.2.2.2 Lander Operational Requests (LOR)

3.2.2.2.1 Description

The LOR file is the main means of the Lander team (more specific, the LCC) to communicate their operational requests to the RSOC. The format is identical to that of the OIOR file and we refer to the definition in the previous section. Note that to ensure quick forwarding of this file to the RMOC, there will be a guaranteed acceptance time as specified in Section 2.2.1.5. No format conversion is necessary if the files

from the Lander are submitted in the POR syntax without the additional keywords as previously defined, again to reduce the time needed to forward it to the RMOC and to reduce conversion errors.

Note: Both the OIOR and the LOR file are called Operational Request Files (ORF).

3.2.2.2.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`LOR_`", the source `sor` is "`PIL`", the destination `des` is "`RSO`".

3.2.2.2.3 File format

The format of the LOR is identical to the OIOR file, see Section 3.2.1.3.

3.2.2.3 Lander Parameter information

3.2.2.3.1 Description

The Lander team will, in co-operation with the MOC, propose the spacecraft position, attitude, and time for the separation. This will be provided in a text document very similar to the Consolidated Scenario Parameter Lists (CSPL) used as an interface between the RSOC and the RMOC Flight Dynamics team. The detailed content is still under definition by the Lander team.

3.2.2.3.2 File naming convention

This will be a text document with a number according to the Lander documentation system.

3.2.2.3.3 File format

The file format may be Word, Pdf, or ASCII. The date and time of creation and an author shall be given in the document.

3.2.2.4 Lander Operations Plan (LOP)

3.2.2.4.1 Description

The Lander team will produce a Lander Operations Plan (LOP), which is a human-readable form of the Lander operations. It is generated with a software tool called MOST. This LOP will be converted to the LOR file by the Lander team. Both the LOR file and a LOP in ITL syntax will be provided to the RSOC.

3.2.2.4.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`LOP_`", the source `sor` is "`PIL`" as defined in Table 3, the destination `des` is "`RSO`".

3.2.2.4.3 File format

The file format shall be an ASCII file. It shall follow the ITL syntax and be identical to the OIOR file in ITL syntax. Refer to Section 3.2.1.3.5 for details.

3.2.2.5 Lander software update

3.2.2.5.1 Description

A Lander software update will be done via the Telecommand Sequence update request.

3.2.2.5.2 File naming convention

The file naming convention shall follow the definition for Telecommand Sequence updates, see Section 3.3.2.3.

3.2.2.5.3 File format

The file format shall follow the definition for Telecommand Sequence updates, see Section 3.3.2.3.

3.2.3 Information from the RSOC to the Experimenter teams

3.2.3.1 Acknowledge file (ACKN)

3.2.3.1.1 Description

For each file sent from the Experimenter teams to the RSOC via the DDS, a software tool called "Operational Request File Acknowledger (ORF-A)" will acknowledge the receipt of this file. It will do this by ftp-ing an acknowledge file as described in this section to a server to be defined by the Experimenter. This ftp server shall be defined in the XML file as listed in Appendix B by the Experimenters. User name and password shall be transferred via secure means (personal communication).

Currently there is no possibility to provide acknowledgments to additional server sites. Only one can be defined in the XML file at a time. Therefore PI teams are responsible to forward acknowledgements if they so wish.

3.2.3.1.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "ACKN", the source `sor` is "RSO" as defined in Table 3, the destination `des` is "PIx" with x the identifier for the Experimenter team.

3.2.3.1.3 File format

The file shall be an ASCII file. Each line shall have a maximum number of 128 characters, including a line feed (<LF> or ASCII character 10 decimal).

Comment lines are allowed following the XML rules.

The file shall give a description of the acknowledgement in XML format. For the defined keywords, see the example. The description of the error number is given in Appendix C.

3.2.3.1.4 Example

```
0         1         2         3         4         5         6         7         8
12345678901234567890123456789012345678901234567890123456789012345678901234567890
<?xml version="1.0"?>
<!-- ORFA -->
<acknowledgement>
  <receive_date_utc>2001-10-08</receive_date_utc>
  <receive_time_utc>14:45:08</receive_time_utc>
  <receive_date_system>2001-10-08</receive_date_system>
  <receive_time_system>16:45:08</receive_time_system>
<orfa>
    <version>1.0</version>
    <host>redstar.so.estec.esa.nl</host>
    <pid>18473</pid>
    <ftp>
      <destination_server>bear.so.estec.esa.nl</destination_server>
      <user>arjan</user>
      <upload_directory>/home/arjan/temp</upload_directory>
      <transfer_attempts>1</transfer_attempts>
    </ftp>

<receive_filename>/home/arjan/pihome/OIOR_PI7RSO_D_____________0005.ROS</receive_filename>
```

```
    <result>failure</result>
    <error>
      <error_number>256</error_number>
      <error_string>incorrect submission number, number too
big</error_string>
      <error_severity>fatal</error_severity>
    </error>
    <epstest>
      <version>0.6</version>
      <output>
      </output>
    </epstest>
    <log_message>
      Submission number sequence incorrect (submitted: 00005)
      File was succesfully ingested into the ESOC-database.
    </log_message>
  </orfa>
</acknowledgement>
```

3.2.3.2 Science Activity Plan (SAP)

3.2.3.2.1 Description

The Science Activity Plan is a time-ordered listing of Mission Scenarios. The current baseline is that this will be a descriptive text document.

3.2.3.2.2 File naming convention

The file will be a text document following the Rosetta numbering scheme: RO-SGS-PL-xxxx. The file name shall be of the form `RO-SGS-PL-xxxx_I_R_<Short title>.ext` where xxxx is the number of the document, I the issue, R the revision number, `<Short title>` is an optional short title, `<date>` is the date in the format `YYYYMonDD` (*e.g.* 2007Mar22) and `ext` is the extension (`doc` for a Word document, `pdf` for a Portable Document Format document).

3.2.3.2.3 File format

The file will be a text document which will be produced in Word and made available in pdf format. The date and time of creation and an author shall be given in the document.

3.2.3.3 Master Science Plan (MSP)

3.2.3.3.1 Description

The Master Science Plan will be more detailed than the SAP. It will include the experiment operations at a minimum down to mode level.

During the cruise phase operations, the MSP is used to summarize on top level the operational plan for individual scenarios, *e.g.* a flyby.

3.2.3.3.2 File naming convention

The file will be a text document following the Rosetta numbering scheme: RO-SGS-PL-xxxx. The file name shall be of the form `RO-SGS-PL-xxxx_I_R_<Short title>.ext` where xxxx is the number of the document, I the issue, R the revision number, `<Short title>` is an optional short title, and `ext` is the extension (`doc` for a Word document, `pdf` for a Portable Document Format document).

A zipped version of the document will be distributed via the DDS. For that version, the file name shall follow the DDS convention as given in Section 3.1, with the file type identifier `ffff` being "`MSP_`", the source `sor` is "`RSO`", the destination `des` is "`RMX`" (even if it is made available to the PIs – RMX means that it will go to the DDS).

3.2.3.3.3 File format

The file will be a text document which will be produced in Word and made available in pdf format. The date and time of creation and an author shall be given in the document.

3.2.3.3.4 Example

For an example, see the Master Science Plan for the Mars Swingby, RD 16

3.2.3.4 Final POR file and planning POR file (POR_, PORP)

3.2.3.4.1 Description

The final POR file is available after all the individual OIOR/LORs have been consolidated and iterated with the Experimenter teams to be free of conflicts. They will be sent to the RMOC and at the same time made available to the Experimenter teams via the DDS. Before the final POR file is available, a number of intermediate (preliminary or planning) POR files might be generated in the normal course of the planning process. These will be called `PORP`.

3.2.3.4.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`POR_`" for the final POR file, "`PORP`" for the intermediate or planning POR files, the source `sor` is "`RSO`", the destination `des` is "`RMX`" (even if it is made available to the PIs – RMX means that it will go to the DDS).

3.2.3.4.3 File format

The file format will be as defined in AD3 (CRID), Section 7.1.

To maintain traceability, the following comment lines shall be added at the beginning of the file:

```
C Generation Time: <date_and_time_of_generation_in_CCSDS_format>
```

where `date_of_generation_in_CCSDS_format` is the date and time of the generation of this (not the source) file, in CCSDS format.

The names of the source files used to generate this POR file shall be given in the "Z" header as described in AD3 (CRID), with a record identifier set to 'L".

3.2.3.4.4 Example

For an example, see AD3 (CRID).

3.2.3.5 Conflict file (CONF)

3.2.3.5.1 Description

As an output of the planning, conflicts might result between different experiments. The Experiment Planning System creates a file listing these conflicts. While this file is actually used only by RSOC internally, it will be distributed for information to the Experimenter teams. This should allow clarifying conflicts more easily.

3.2.3.5.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`CONF`", the source `sor` is "`RSO`", the destination `des` is "`RMX`".

3.2.3.5.3 File format

The file shall be an ASCII file. Each line shall have a maximum of 128 characters, including a line feed (<LF> or ASCII character 10 decimal). The date and time of creation and an author shall be given as a comment in the beginning of the file.

Each file lists the time and a message for the conflict in a columnar way as defined in Table 7.

Comment lines are allowed anywhere in the file. They start with the character "#" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

Each column shall be separated by one or more white spaces. Continuation lines are marked by a "/" at the end of the line.

Table 7: File format for the CONF file.

Field name	Column	Format	Comments
`<Time | Event>`	1	20X	CCSDS format time (YY-DDDThh:mm:ssZ) Or ITL time format ([±][DDD_]hh:mm:ss). Or event label as given in AD4, Appendix H.
`<Conflict>`	2	20X	The conflict message, as defined in the Experiment Description Files.

3.2.3.5.4 Example

Note: The given conflict examples are fictive.

```
         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890
#--------------------------------------------------------------------------------
# Example CONF file
# Created 2001 Sep 22, 10:00:04 UTC, dvk

12-313T22:00:00Z VIRTIS_COOLER_NOT_OFF_START
12-313T22:00:00Z NAC_HAS_SUN_IN_FOV_START
12-313T23:00:00Z VIRTIS_COOLER_NOT_OFF_END
#--------------------------------------------------------------------------------
```

3.2.3.6 Reference pointing information (RPI)

3.2.3.6.1 Description

For planning purposes, RSOC will provide a *reference pointing information* file, typically one for each Mission Scenario.

Note that during the mission, an attitude information file will be distributed via the DDS from ESOC Flight Dynamics Team (FDT). The format is described in the DDID Annex H (AD4). The files provided by the FDT override the RPI files.

3.2.3.6.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`RPI_`", the source `sor` is "`RSO`", the destination `des` is "`PIX`".

3.2.3.6.3 File format

The file shall be an ASCII file. Each line shall have a maximum of 128 characters, including a line feed (<LF> or ASCII character 10 decimal). The date and time of creation and an author shall be given as a comment in the beginning of the file.

Each file lists the time and a message for the conflict in a columnar way as defined in Table 8. Each column shall be separated by one or more white spaces. Continuation lines are marked by a "/" at the end of the line.

Comment lines are allowed anywhere in the file. They start with the character "#" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

Table 8: File format of the RPI file.

Field name	Column	Format	Comments
<Start_time | Event_label>	1	20X	CCSDS format time (YY-DDDThh:mm:ssZ) Or ITL time format (±DDD_hh:mm:ss). If both start and end time are given, the start time is the first allowed time for the execution of the command. Or event label as defined in AD4, Annex H
<End_time | Delta_time | Empty_label>	2	20X	End_time is the end time in CCSDS format time (YY-DDDThh:mm:ssZ) or in ITL time format (±DDD_hh:mm:ss) If both start and end time are given, the end time is the last allowed time for the execution of the command. Delta_time is in the format ±[DDD_]hh:mm:ssWhere: DDD is the number of days in the range 0 to 999; hh is the number of hours in the range 0 to 23; mm is the number of minutes in the range 00 to 59; ss is the number of seconds in the range 00 to 59; Leading zeros must always be inserted to ensure that the field is 4/2 digits long; or in ITL time format (±DDD_hh:mm:ss). Empty_label means that the field is empty, a dash ('-') has to be given.
<Pointing_mode>	2	20X	See separate description in AD9.
<Roll_request>	3	10X	field empty: No constraint on roll. 'ROLL_FIXED': It is requested that there is no roll about the +z axis. Note that this request can be

			fulfilled only in exceptional cases. 'POWER_OPTIMIZED': Solar arrays are oriented perpendicular to sun (typically identically to 'no constraint on roll').

3.2.3.6.4 Example

```
          1         2         3         4         5         6         7
1234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
# Example RPI file
# Created 2001 Sep 22, 10:02:00 UTC, dvk

000_00:00:00    NADIR
000_00:01:00    ROLL_FIXED (tbd)
000_00:01:00    INERT (LAT = 315.15 LONG = +31.12)
#-------------------------------------------------------------------------------
```

3.2.3.7 Reference trajectory information (RTI)

3.2.3.7.1 Description

For planning purposes, RSOC will provide a *reference trajectory information* file, typically one for each Mission Scenario.

Note that later in the mission a trajectory information file will be distributed via the DDS from ESOC Flight Dynamics. The format is described in the DDID Annex H (AD4).

3.2.3.7.2 File naming convention

The current files, provided by the Mission Analysis Section of ESOC, do not conform to the convention used in the previous sections. Currently, the following names are used:

Trajec.SUN	Trajectory around the Sun in Sun-centered coordinates
EarthEscape.EAR	Escape from the Earth after separation from the upper stage
Earth1ec.EAR	1st Earth flyby in Earth-centered coordinates
Earth1ec.SUN	1st Earth flyby in Sun-centered coordinates
Otawaraec.AST	Otawara flyby in asteroid-centered coordinates
Earth2ec.EAR	2nd Earth flyby in Earth-centered coordinates
Earth2ec.SUN	2nd Earth flyby in Sun-centered coordinates
Siwaec.AST	Siwa flyby in asteroid-centered coordinates

3.2.3.7.3 File format

The file shall be an ASCII file. Each line shall have a maximum of 128 characters, including a line feed (<LF> or ASCII character 10 decimal).

Each file lists the time and a message for the conflict in a columnar way as defined in Table 9.

Comment lines are allowed anywhere in the file. They start with the character "#" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

Table 9: File format of the RTI file.

Field name	Column	Format	Comments
<Time>	3-14		Time in decimal days since 1 Jan 2000, 0h UT
<x pos>	16-31		X position of the s/c in km
<y pos>	33-47		Y position of the s/c in km

<z pos>	49-63		Z position of the s/c in km
<x vel>	65-74		X velocity of the s/c in km/s
<y vel>	76-85		Y velocity of the s/c in km/s
<z vel>	87-96		Z velocity of the s/c in km/s

3.2.3.7.4 Example

This example gives the trajectory of the Rosetta spacecraft during the first days of the mission in sun-centered coordinates.

```
         1         2         3         4         5         6         7         8         9
123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
  1116.1178704    -74937115.159   126714252.275       -3210.514 -36.795701 -14.120886   1.212388
  1117.1178704    -77482287.310   125193115.614        94136.578 -28.793775 -17.669116   1.002390
  1118.1178704    -79951979.521   123650780.449       178791.307 -28.397580 -18.045964   0.964674
  1118.9535289    -81992156.220   122335428.439       247930.319 -28.119352 -18.391786   0.951781
  1119.9535289    -84407663.035   120728235.123       329733.746 -27.796071 -18.812184   0.942529
  1120.9535289    -86795350.004   119084691.180       410880.796 -27.474175 -19.232446   0.936187
  1121.9535289    -89155104.447   117404965.754       491544.653 -27.149025 -19.649377   0.931183
  1122.9535289    -91486552.680   115689418.781       571807.741 -26.818737 -20.061467   0.926833
  1123.9535289    -93789209.355   113938508.966       651710.234 -26.482462 -20.467849   0.922794
  1124.9535289    -96062538.584   112152755.399       731269.958 -26.139822 -20.867956   0.918875
```

3.2.3.8 Reference comet model (RCM)

3.2.3.8.1 Description

For planning purposes, RSOC will provide a *reference comet model*.

At the beginning of the mission, no direct information is available on the comet. Therefore, some standardized models should be available to coordinate the planning process. RSOC will provide a comet reference model for design studies (size, mean density, rotation period, design cases for rotation axis orientation).

Later in the mission, a *comet kinematics file* will be generated by the RMOC (Flight Dynamics) and distributed via the DDS. The format of this file is described in the DDID Annex H (AD4).

3.2.3.8.2 File naming convention

The file will be a text document that follows the Rosetta numbering scheme: RO-SGS-SP-xxxx. The file name shall be of the `form RO-SGS-SP-xxxx_I_R_<Short title>.ext` where xxxx is the number of the document, `I` the issue, `R` the revision number, `<Short title>` is a short title, and `ext` is the extension (`doc` for a Word document, `pdf` for a Portable Document Format document).

3.2.3.8.3 File format

The file will be a text document which will be produced in Word and made available in pdf format.

3.2.3.9 Reference Flight Dynamics Events (RFDE) file

3.2.3.9.1 Description

For planning purposes, RSOC will provide a *Reference Flight Dynamics Event* (RFDE) file, typically one per mission scenario.

Note that later in the mission a Flight Dynamics Event file will be generated by the RMOC (Flight Dynamics) and distributed via the DDS. The format of this file is described in the DDID Annex H (AD4).

3.2.3.9.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`RFDE`", the source `sor` is "`RSO`", the destination `des` is "`ALL`".

3.2.3.9.3 File format

The file format shall be as described in the RD4 (DDID), Annex H. To ease the planning process, the keywords defined in Table 10 are allowed in addition. The date and time of creation and an author shall be given as a comment in the beginning of the file.

Table 10: Allowed keywords in the header of the RFDE file.

Keyword	Parameters	Comments
`Start_time:`	`<date/time>`	`date/time`: is the start time in CCSDS time format or ITL format. Example: `Start_time: 12-313T20:15:13Z`
`Init_value:`	`<event_label>`	Allows to set an initial value for an event state.

3.2.3.9.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
#
# EPS Event File example (from Smart-I)
# Created 2001 Jan 10, 10:00:05 UTC, smart-I ptb

Start_date: 1-July-2004
Start_time: 00:00:00

Init_value: ESTEC_AOS_0
Init_value: TENERIFE_AOS_0
Init_value: KOUROU_AOS_0
Init_value: TENERIFE_AOS_10
Init_value: KOUROU_AOS_10

000_00:00:01   SUBSAT_ILLUM_GE_0
000_00:00:01   SUBSAT_ILLUM_GE_10
000_00:29:23   SUBSAT_ILLUM_GE_20
000_01:08:41   AT_APOLUNE
000_01:41:22   ESTEC_LOS_0
000_02:17:14   SUBSAT_ILLUM_GE_30
000_03:43:31   TENERIFE_LOS_10
000_04:38:52   TENERIFE_LOS_0
000_04:47:14   SUBSAT_ILLUM_GE_45
000_06:37:54   AT_LUNAR_EQUATOR
000_07:19:18   KOUROU_LOS_10
# etc.
#-------------------------------------------------------------------------------
```

3.2.3.10 Derived information

These are graphs and events derived from the attitude and trajectory files, *e.g.* curves with illumination conditions, distances to landmarks, *etc.* Details on what will be provided will depend on the requests of the Experimenter teams.

The RSOC will provide reference data for preliminary planning purposes within the "Mission Scenario Documents, see RD2 for an example.

Later in the mission, the RMOC will generate this information.

3.3 Maintenance Of Rosetta Mission Implementation Base (RMIB)

3.3.1 General Definition

The Rosetta Mission Implementation Base links the telecommands and telecommand sequences of the experiments with the bit patterns which are actually uplinked. The database is in the process of being filled up in a direct interface with RMOC at ESOC. Some of the updates, however, will go via the RSOC keeping the one-line interface concept to keep the RSOC aware of changes. The following sections describe these updates. The RSDB (Rosetta System Database) which was used on the test floor is the part of the RMIB without Telecommand Sequences.

3.3.2 Operational Database Interface Procedures

3.3.2.1 Database Change Request for a Telecommand Update Request (TURD)

The Telecommand Update Requests will be done by the experimenter by filling out the Database Change Request form and submitting it directly to RMOC. RSOC shall be copied.

The form sheet is available on Livelink (RD12). Guidelines to fill out the form sheet can be found in Section 9 (Appendix EI).

3.3.2.2 Command Sequences change request (CS_D)

3.3.2.2.1 Description

If updates need to be made to the telecommand sequence entries of the RMIB, these can be done via the FOP Change Request (using the form sheet RO-EST-FO-012) of type CS_D.

For content updates and creation of sequences schedulable by RSOC (including change of the RSOC flag from N to Y) an additional Command Sequence Update Request (type CS_P) is mandatory. The CS_P follows the format used in the Experiment Description Files (EDF) used in the science operations planning. It is needed by RSOC to update their planning database.

For content updates and creation of sequences which are not schedulable by RSOC, the EDF fragment is not needed, however, a dummy CS_P file has to be delivered to keep the numbering scheme consistent.

3.3.2.2.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`CS_D`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`".

3.3.2.2.3 The sequential file counter at the end of the file name *must be identical* to the CS_P it belongs. Each CS_D may describe only one CS_P file.

3.3.2.2.4 File format

The file shall be a zipped MS Word file. It shall be a filled-out version of the FOP Change Request template, RO-EST-FO-0013 (RD 13), available on the Rosetta livelink.

3.3.2.2.5 Example

See following page.

FOP Change Request – Example only!

ROSETTA FOP CHANGE REQUEST								
Request Number:				Date: 26-July-2007				
Originator: B. Pätz				Originator Reference: LCC_053				
Procedure(s) affected:								
Proc ID	Title	Old SOC Flag	New SOC Flag	Vol. 6.08 updt	Old Ver	Aut.	New Ver.	Reval
LC-SEQ-100	Lander CDMS TCs	Y	Y	N				
LN-SEQ-100	Lander CONSERT TC	Y	Y	N	-			

Change description:

- Refresh sequences ALCS100* in order to exclude VLCDH010.
  (keep same order for formal parameters)
- Refresh sequence ALNS100A in order to exclude VLND0010.
  (keep same order for formal parameters)

Reason for change:
Propagate telecommand update request to sequences.

Change request reference (e.mail, meeting, OR, etc.)

Email B. Pätz:
'RSDB change request DCR_LCC_005_PC6', 26th of July 2007

Attachments:

Approved by:	Date:	FOP Issue:
Implemented by:		Date:
Sequences to be Imported: All ALCS100* (16 sequences) ALNS100A	Sequences to be Deleted:	
Imported by:	Date:	MIB ver.
FOP hardcopy updated by:	Date:	
FOP e.copy updated by:	Date:	
FOP Vol. 6.08 checked by:	Date:	

3.3.2.3 Command Sequences (CS_P)

3.3.2.3.1 Description

As described in the previous section, for command sequence changes which affect sequences that can be scheduled by RSOC, a filled-out CS_P file has to be provided in parallel to the CS_D, using the same number.

If the sequence is not schedulable by RSOC, provide a dummy file with the correct file name to keep the numbering consistent.

3.3.2.3.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`CS_P`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`".

NOTE: The name of the telecommand sequence shall follow the naming convention given in RD10, Section B7.2, p. 41. It is repeated here for convenience:

Each command sequence shall adopt the following naming convention:

- a descriptive long name (or command sequence title, 20 characters max. length plus 4 characters for version number)
- a unique command sequence ID (8 characters max length)

The command sequence ID shall follow the convention

`AXXYnnnZ`

where

- `A` is a fixed character, imposed by the RMIB naming convention, to identify that this RMIB item is a command sequence;
- `XX` is the two-letter abbreviation for an instrument, according to Table 11,
- `Y` is the letter "F, 'S' or 'C' to denote an FCP, a pure command sequence or a CRP, respectively,
- nnn is a procedure number. The PI is free to choose a number as he/she wishes, as long as it is unique.
- `Z` is 'A', 'B', 'C', .. To be used to distinguish command sequence generated from the same procedure. If a single sequence is generated from the procedure, it shall be set to A.

The sequence parameters shall follow the naming convention

`VXXkkkkk`

where

- `V` is a fixed character;
- `XX` is identical to the letter used in the telecommand sequence
- `kkkkk` are numbers or letters. The PI is free to choose a combination of number and letters as he/she wishes, as long as it is unique.

Table 11: Two-letter abbreviations for the experiments

Experiment	Abbreviation	Experiment	Abbreviation
ALICE	AL	ROSINA	RN
CONSERT	CN	RPC	RP
COSIMA	CS	RSI	RS
MIDAS	MD	GIADA	GD
MIRO	MR	VIRTIS	VR
OSIRIS	SR	LANDER	LZ
SREM	SE		

3.3.2.3.3 File format

The file shall be an ASCII file. Each line shall have a maximum of 128 characters, including a line feed (<LF> or ASCII character 10 decimal). The date and time of creation and an author shall be given as a comment in the beginning of the file.

Each file defines a name and the contents for a telecommand sequence following the format definition of "actions" in the Experiment Description Files. The format definition is given in the EPS ICD (AD 12).

Comment lines are allowed anywhere in the file. They start with the character "#" at the beginning of a line and may be followed by any ASCII character. A "#" in the middle of a line indicates that all following characters will be a comment. Empty lines are allowed anywhere in the file.

3.3.2.3.4 Example

```
0         1         2         3         4         5         6         7
12345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
#-------------------------------------------------------------------------------
#
# Example of a minimal telecommand sequence update request
# Note that according to the definition of the EDF format, many things can
# be added, e.g. resource requirements, detailed durations, etc.
#
# Created 2001 Oct 11, 10:10:10 UTC, dvk + rh

Action: AALS020A "Example from AFT v01"
Action_parameters: VALS0201 VALSO202 VALS0203
Run_type: ABSOLUTE
Run_actions:
000_00:00:00 ZAL19222 (PALD2301 = VALS0201) # discriminator setpoint
000_00:01:00 ZAL19211 (PALD1701 = 30 \
                       PALD1702 = VALS0202)
000_00:02:00 ZAL00301 (PALG0SID = VALS0203)  # default value

#-------------------------------------------------------------------------------
```

3.3.2.4 On-board Control Procedures – Change Request (OBCD)

The On-Board Control Procedure change request will be done by the experimenter in direct interaction with the RMOC. The detailed procedure is documented in the SOIA (AD 02).

3.3.2.5 Onboard Monitoring

All onboard monitoring requests have to be addressed directly to RMOC and are not part of this ICD.

3.3.2.6 Flight Control Procedures (FCP)

Flight Control Procedures are used for interactive, manual activities and are documented in the Flight Operations Plan. Any update requests are done by filling out a FOP change request form (RD 13) and submitting it to RSOC following the rules as defined in Section 3.3.2.2, Command Sequence Change Request (CS_D). Also see Section 2.2.1.2.1 for some more detailed explanations.

3.3.2.7 Ground Monitoring

All ground monitoring requests have to be addressed directly to RMOC and are not part of this ICD.

3.4 On-board Software Maintenance

3.4.1 Description

The Rosetta payload experiments provide the capability to the user to reprogram their internal software. This is expected to be used during the mission, although as an exceptional measure and not as a routine operation.

Instrument software patches can range in complexity from simple updates of parameters to significant modifications of the running code.

The procedure to be followed (which is detailed below) for patching is dependent on whether or not the instrument supports Service 6 (memory management). For definition of Service 6 refer to EID-C (AD5).

3.4.2 Onboard Software Maintenance Responsibilities

The RSOC is responsible for the consistency between the transferred patch files and the related scheduling requests. Correctness of the patch files is the responsibility of the Experimenter teams, who generated the files. The RMOC is responsible for the correct execution of the patch activity in strict accordance with the procedures and to make sure that the received patch files are implemented on-board the spacecraft.

3.4.3 Onboard Software Maintenance Procedures

NOTE: To simplify the interface discussions, all technical details of the implementation of the software patch shall be discussed directly between the PI teams and RMOC; RSOC shall be kept in copy of the discussion. Only the final, formal file delivery shall be going via the official interface as described in the following Sections. If an on-board software maintenance leads to one or more telecommand sequence changes, these need to be requested to be updated in the database as described in the relevant Section.

3.4.3.1 Memory Patch Requests for experiments supporting Service 6 (MPRP, MPR_)

3.4.3.1.1 Description

On-board software running in the experiments can be patched by using the Memory Patch Request. More information can be found in AD 05 (EID-C), Section 8, p. 9.

3.4.3.1.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`MPRP`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`". Note that the RSOC will change the file type to "`MPR_`" when forwarding this file to the RMOC.

3.4.3.1.3 File format

The file format shall follow the definition in AD3 (CRID), Section 7.3.

3.4.3.1.4 Example

An example is given in AD3 (CRID), Section 7.3.

3.4.3.2 Memory Dump Requests for experiments supporting Service 6 (MDRP, MDR_)

3.4.3.2.1 Description

A memory dump of the on-board experiment software can be requested with the Memory Dump Request. More information can be found in AD5 (EID-C), Section 8, p. 9.

3.4.3.2.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`MDRP`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`". Note that the RSOC will change the file type to "`MDR_`" when forwarding this file to the RMOC.

3.4.3.2.3 File format

The file format shall follow the definition in AD3 (CRID), Section 7.4.

3.4.3.2.4 Example

An example is given in AD 03 (CRID), Section 7.4.

3.4.3.3 Memory Checksum Requests for experiments supporting Service 6 (MCRP, MCR_)

3.4.3.3.1 Description

Verifying the memory checksum can be requested using the Memory Checksum Request. More information can be found in AD5 (EID-C), Section 8, p. 9.

3.4.3.3.2 File naming convention

The file naming convention follows the description given in Section 3.1, with the file type identifier `ffff` being "`MCRP`", the source `sor` is "`PIn`" as defined in Table 3, the destination `des` is "`RSO`". Note that the RSOC will change the file type to "`MCR_`" when forwarding this file to the RMOC.

3.4.3.3.3 File format

The file format shall follow the definition in AD3 (CRID), Section 7.5.

3.4.3.3.4 Example

An example is given in AD3 (CRID), Section 7.5.

3.4.3.4 Instruments Not Supporting Service 6

For this case there are no services available at ESOC or on-board the spacecraft. The following will apply:

- The experiment team shall define in the Rosetta Mission Implementation Database (RMIB) all necessary patch/dump TCs (with parameterized data).
- The experiment team shall define in the Rosetta Mission Implementation Database (RMIB) all necessary TC sequences for OBSM activities.
- The experiment team shall schedule OBSM activities via the OIOR files. The Lander will use the Command Sequence change request format (CS_P).

3.5 Software and Documentation

3.5.1 General Definition

All software modules and all documents that affect the interface specification and/or procedures can be updated during the mission, following the rules listed in this Section.

RSOC documents affecting this interface are listed in Section 1.3.

Relevant Experimenter documents are *e.g.* the User Manuals, descriptions of any software to be run by the RSOC, *etc.*

3.5.2 Software and Documentation Update Responsibilities

Each center is responsible for maintaining the software and documentation produced by the center itself. Changes originated by one center which have impact on the other centers have to be channeled via the Rosetta Mission Manager, which will solve conflicts and provide final approval.

Configuration control is applied in RSOC on all operational software and documentation from a number of months before launch (depending on the item) onwards.

3.5.3 Software and Documentation Update Interface Procedures

3.5.3.1 Software Updates

Whenever software is updated, it shall undergo formal testing and approval. A small change (patch) in software shall increase the revision number. Any major change shall increase the issue number.

After release of Issue 1 of a software, its configuration shall be managed by a configuration management tool (most likely Concurrent Versioning System CVS). Changes in the software shall be requested via so-called Software Change Requests (SCRs). These will be discussed and approved by a dedicated Configuration Control Board (CCB) for each software item. Currently, the following software items are identified as to be configuration controlled:

- EPS
- PTB
- MAPPS
- ORF-A
- all EDFs
- all planning timelines (OIOR/LORs)

A proper procedure and the final tool will be defined until the arrival at the comet.

3.5.3.2 Documentation Updates

Once a document has been released as "Issue 1", it shall be under formal change control. This means that any change has to be requested via a formal Document Change Request (DCR). These will be discussed and approved by a dedicated Configuration Control Board (CCB) for each document. For minor changes

(*e.g.* only requiring single pages to be exchanged in the document), the revision number of the document will increase. Major changes (*i.e.* requiring an update of the complete document) shall increase the issue number of the document.

3.5.4 Standards

3.5.4.1 Documentation standards

Documents written by RSOC will be produced using either of the following two methods:

- Microsoft Word
- Plain ASCII files:
  - maximum line length of 80 characters (128 characters for certain files)
  - <LF> code (ASCII character 10 decimal) can be used to aid formatting
  - <TAB> shall ***not*** be used.

RSOC documents are predominantly written using Microsoft Word from which Portable Document Format (pdf) files are generated, currently using Acrobat Writer 5.0.

RSOC will accept hardcopy documents or PDF-files from the Experimenters produced by whatever word processor they have, however, electronic (PDF-) files are preferred; RSOC has no requirement to import document source files.

Documents will be interchanged between RSOC and the Experimenter teams by one of the following methods:

- Electronic mail:
  - Plain ASCII files can be sent "as is"
  - Small Word files should be sent as email attachments
  - Small PDF files should be sent as email attachments
- FTP:
  - It is preferable to transport large PDF files by FTP rather than by Electronic mail
  - If the document is compressed using ZIP, binary mode FTP must be used.
- Use of the RSOC documentation server, currently based on the tool *livelink*.
- Paper hardcopy by postal services (supplemented by fax if the circumstances warrant and if the document is not too long) (discouraged!).

3.5.4.2 RSOC-supplied software

3.5.4.2.1 Standards for design & coding

RSOC is utilizing several platforms for developing and running software:

- the IRIX operating system running on SGI Workstations, together with Java and ANSI C;
- Microsoft Windows (Win98, Win2000, and NT) running on Intel-based Personal Computers, together with Java, ANSI C, and IDL (Interactive Data Language).

All software developed by the RSOC will follow the guidelines defined in AD6. A deviation is made in some cases by combining multiple documents into a single physical document. However, all mandatory practices as defined in AD6 will be followed.

Software developed by RSOC for delivery to the Experimenter teams will be designed to be portable where practicable but this will not ensure that it will run without change in other environments. Thus, support for operations in a different environment may be limited. RSOC will, within its design process, assess the portability issues and use best efforts to demonstrate portability.

3.5.4.2.2 Transfer procedure

RSOC will make available the source code of all software written for the science operations planning, *e.g.* the Experiment Planning System (EPS). It will be made available to the Experimenter teams via the RSOC web site or via using the RSOC documentation server.

Supportive documentation (installation notes, test and verification procedures, user notes, (*e.g.* see RD3) will be made available as specified in Section 3.5.4.1.

3.5.4.2.3 Software Support

Software support for software written by the RSOC will be given on a best-effort basis only. Note, however, that each software package developed at the RSOC shall be accompanied with the documentation following ECSS guidelines.

3.5.4.3 Experimenter-supplied software

3.5.4.3.1 Guidelines for design & coding

Software written by the Experimenter teams for execution within RSOC, if any, is expected to conform to the standards specified in AD6, unless overriding circumstances make this impractical. In this case the Experimenter group and RSOC must make a careful assessment of the impact on the Experimenter software expected to run in the RSOC.

The Experimenter groups are implementing software on a variety of platforms but RSOC is utilizing the IRIX system on SGI Workstations, and Microsoft Windows on Personal Computers, together with Java and ANSI C, for developing and running software. Experimenter groups using other platforms are expected to pay particular care to the problems associated with porting their software into the RSOC environment.

3.5.4.3.2 Transfer procedure

RSOC will prefer executable files for any software. Source code and associated build files/procedures must be provided in addition. The transfer media for software from the Experimenter teams to RSOC will be one of the following:

- FTP of executables, source code and associated procedures;
- electronic mail of "small" amounts of the above;
- floppy disk if necessary;
- CD-Rom;
- use of the RSOC documentation server.

Supportive documentation (installation notes, test and verification procedures, user notes) is expected, though the type and extent provided might be negotiated between RSOC and the individual Experimenter teams. Such documentation should be made available as specified in Section 3.5.3.1.

3.5.4.3.3 Software Support

Because of the multiple platforms being used by the Experimenter teams the question of the Experimenter groups providing support to RSOC for this software is a complex issue. It is clear, though regrettable, that Experimenter software developed on source platforms which are highly compatible with the RSOC platform will be easier for the Experimenter team to support in terms of building the PI software at RSOC and trouble shooting it.

Part of the transfer procedure will be for the Experimenter teams to supply installation notes, test and verification procedures and user notes as appropriate to the software.

3.6 Performance Monitoring

3.6.1 Payload health monitoring

Certain housekeeping parameters can be monitored by the RMOC for the Experimenter teams when they are not co-located at ESOC. If a housekeeping value goes out of limits, the Experimenter team will be notified. The formal request for monitoring shall be done in the Experiment User Manuals. To quickly implement monitoring, a format as specified in Section 3.3.2.5 shall be used.

3.6.2 Inter-experiment calibration

Inter-experiment calibration is requested by some experiments in the EID B/LID B documents. The RSOC will consolidate the OIOR/LOR files in such a way to ensure that each request can be fulfilled. In cases where this is not possible, the Project Scientist has the final authority to resolve any conflicts.

3.7 Experiment Specific Issues

tbd

4. INTERFACE VERIFICATION

4.1 Testing

4.1.1 Introduction

As defined in the RSOC Implementation Plan (AD 07), the RSOC will be in the Development Phase until end of 2001. After that, there will be a Pre-launch and Test Phase. As the name implies, this is the time of detailed testing. Different levels of testing are foreseen:

- Individual interface tests between individual Experimenter teams and the RSOC
- Individual interface tests between RMOC and RSOC
- End-to-end tests where the Experimenter supplies OIOR/LOR files, the RSOC consolidates and checks them and forwards them to the RMOC, and the RMOC runs them on the Rosetta simulator
- End-to-end tests with the real spacecraft during the SVT1 (Apr 2002).
- Exercising of the planning concept using the software tools (EPS, PTB) during the commissioning phase

For all tests, a test plan will be produced before the test. After the execution of the test, a test report will be produced. A more detailed list of the tests to be performed is given in the RSOC System Test Plan (RD 15).

The testing between RSOC and RMOC is described in Rosetta Ground Segment System Test Plan (RD 09).

4.2 Training

RSOC shall perform training sessions for the Experimenter teams for any software they will supply, *e.g.* the Experiment Planning System. Dates and lengths of these training sessions are *tbd*.

5. Schedule

The schedule for the development and operation of RSOC/Experimenter interfaces is given in the RSOC Implementation Plan (AD 07).

6. APPENDIX A - ACRONYMS AND ABBREVIATIONS

For a detailed list of acronyms, see the Rosetta Glossary, see RD 01.

7. Appendix B - Filesource settings for the Operational Request File Acknowledger (ACKN) in XML format

```
<?xml version="1.0"?>
<!DOCTYPE filesource SYSTEM "/var/orfa/lib/ORFAlib/filesource.dtd" [
<!ENTITY % incoming "INCLUDE">
<!ENTITY % outgoing "IGNORE">
<!ENTITY % acknowledgement "INCLUDE">
]>

<!-- FILESOURCE.XML
     Operations Request File Acknowledger - filesource settings
     Date: September 19 2001
     Programmer: Arjan Hulsbosch (ahulsbos@rssd.esa.int)
     For: ESA - RSSD - Planetary
-->

<filesource>

  <!-- the first source is only a storage for the last acknowledgement number,
       for cases where the source is actually unknown -->
  <source mnemonic="ERR">
    <fullname>ERROR</fullname>
    <abbreviation></abbreviation>
    <dbdir>ERR/</dbdir>
  </source>

  <source mnemonic="PI1">
    <fullname>ALICE</fullname>
    <abbreviation>AL</abbreviation>
    <dbdir>PI1/</dbdir>
    <ftp secure="0">
      <server>alice.boulder.swri.edu</server><!-- 65.241.78.39 -->
      <user>rsocftp</user>
      <password>********</password>
      <uploaddir></uploaddir>
    </ftp>
  </source>

  <source mnemonic="PI2">
    <fullname>ROS_TEST</fullname>
    <abbreviation>DT</abbreviation>
    <dbdir>PI2/</dbdir>
    <ftp secure="0" passive="1">
      <server>redstar.estec.esa.int</server>
      <user>rsoc</user>
      <password>********</password>
      <uploaddir>dailytest/acknowledgements</uploaddir>
  </ftp>
  </source>
```

```
<source mnemonic="PI3">
  <fullname>CONSERT</fullname>
  <abbreviation>CN</abbreviation>
  <dbdir>PI3/</dbdir>
  <ftp secure="0">
    <server>consert-ddi.obs.ujf-grenoble.fr</server><!-- 193.54.242.104 -->
    <user>ftp-ddi</user>
    <password>********</password>
    <uploaddir></uploaddir>
  </ftp>
</source>

<source mnemonic="PI4">
  <fullname>COSIMA</fullname>
  <abbreviation>CS</abbreviation>
  <dbdir>PI4/</dbdir>
  <ftp secure="0">
    <server>cosima-db2.fmi.fi</server><!-- 193.166.223.113 -->
    <user>cosima</user>
    <password>********</password>
    <uploaddir>.</uploaddir>
  </ftp>
</source>

<source mnemonic="PI5">
  <fullname>MIDAS</fullname>
  <abbreviation>MD</abbreviation>
  <dbdir>PI5/</dbdir>
  <ftp secure="0">
    <server>saturn.iwf.oeaw.ac.at</server><!-- 193.170.92.21 -->
    <user>midas</user>
    <password>********</password>
    <uploaddir></uploaddir>
  </ftp>
</source>

<source mnemonic="PI6">
  <fullname>MIRO</fullname>
  <abbreviation>MR</abbreviation>
  <dbdir>PI6/</dbdir>
  <ftp secure="0">
    <server>rushmore.jpl.nasa.gov</server>
    <user>anonymous</user>
    <password>rsoc@rofts.esoc.ops.esa.int</password>
    <uploaddir>incoming/miro</uploaddir>
  </ftp>
</source>

<source mnemonic="PI7">
  <fullname>OSIRIS</fullname>
  <abbreviation>SR</abbreviation>
  <dbdir>PI7/</dbdir>
  <ftp secure="0" passive="0">
    <server>134.76.232.5</server>
```

```
    <user>dds</user>
    <password>********</password>
    <uploaddir></uploaddir>
  </ftp>
</source>

<source mnemonic="PI8">
  <fullname>ROSINA</fullname>
  <abbreviation>RN</abbreviation>
  <dbdir>PI8/</dbdir>

  <ftp secure="0">
    <server>rosina.unibe.ch</server><!-- 130.92.144.80 -->
    <user>rosina_dds</user>
    <password>********</password>
    <uploaddir></uploaddir>
  </ftp>
</source>

<source mnemonic="PI9">
  <fullname>RPC_PIU</fullname>
  <abbreviation>RP</abbreviation>
  <dbdir>PI9/</dbdir>
  <ftp secure="0">
    <server>xanthus.sp.ph.ic.ac.uk</server><!-- 155.198.199.5 -->
    <user>rpcdds</user>
    <password>********</password>
    <uploaddir>/rosetta/rpcData/rpcTmp</uploaddir>
  </ftp>
</source>

<source mnemonic="PIF">
  <fullname>RSI</fullname>
  <abbreviation>RS</abbreviation><!-- not official yet -->
  <dbdir>PIF/</dbdir>
  <ftp secure="0">
    <server>134.95.160.153</server>
    <user>ddstest</user>
    <password>********</password>
    <uploaddir>/raid0/incoming/ros</uploaddir>
  </ftp>
</source>

<source mnemonic="PIG">
  <fullname>SREM</fullname>
  <abbreviation>SE</abbreviation>
  <dbdir>PIG/</dbdir>
  <ftp secure="0">
    <server>129.129.190.31</server>
    <user>anonymous</user>
    <password>rsoc@rssd.estec.esa.int</password>
    <uploaddir>/PSI_incoming/pbuehler</uploaddir>
  </ftp>
</source>
```

```
  <source mnemonic="PIH">
    <fullname>GIADA</fullname>
    <abbreviation>GD</abbreviation>
    <dbdir>PIH/</dbdir>
    <ftp secure="0">
      <server>ftp.na.astro.it</server><!-- 193.205.102.10 -->
      <user>giadaftp</user>
      <password>********</password>
      <uploaddir>DDSdata</uploaddir>
    </ftp>
  </source>

  <source mnemonic="PII">
    <fullname>VIRTIS</fullname>
    <abbreviation>VR</abbreviation>
    <dbdir>PII/</dbdir>
    <ftp secure="0">
      <server>ftp.sic.rm.cnr.it</server>
      <user>virtis</user>
      <password>********</password>
      <uploaddir></uploaddir>
    </ftp>
  </source>

  <source mnemonic="PIL">
    <fullname>LANDER</fullname>
    <abbreviation>LZ</abbreviation>
    <dbdir>PIL/</dbdir>
    <ftp secure="0">
      <server>musc048.rs.kp.dlr.de</server><!-- 129.247.113.48 -->
      <user>musc_dds</user>
      <password>********</password>
      <uploaddir></uploaddir>
    </ftp>
  </source>

</filesource>
```

8. Appendix C - Error description of the Acknowledgement file (ACKN) sent by the ORF-A in XML format

```
<?xml version="1.0"?>
<!-- ERRORDESCRIPTION.XML
     Operations Request File Acknowledger - error decriptions
     Associated mission: Rosetta
     Version: final
     Date: November 8 2001
     Last modified: November 8 2001
     Programmer: Arjan Hulsbosch (arjan@so.estec.esa.nl)
     Description:
       Configuration file used for error description. An error consists of four
       attributes: number   (just an entry number)
                   result   (description used internally by ORFA)
                   string   (human-readible description of the error)
                   severity (how bad the error is, can be 'info','warning',
                             'error' or 'fatal')
-->
<error_description>
  <error>
    <number>00</number>
    <result>OK</result>
    <string>Everything ok</string>
    <severity>info</severity>
  </error>
  <error>
    <number>01</number>
    <result>ERRNAME</result>
    <string>Filename check raised error(s)</string>
    <severity>error</severity>
  </error>
  <error>
    <number>02</number>
    <result>ERRCONT</result>
    <string>'epstest' raised errors</string>
    <severity>error</severity>
  </error>
  <error>
    <number>03</number>
    <result>ERRSQNR</result>
    <string>Sequence number incorrect</string>
    <severity>error</severity>
  </error>
  <error>
    <number>04</number>
    <result>ERRDBIN</result>
    <string>File was not ingested into the database</string>
    <severity>error</severity>
  </error>
  <error>
    <number>05</number>
    <result>ERRNMLN</result>
    <string>Filename has other than 37 characters</string>
    <severity>error</severity>
  </error>
</error_description>
```

Appendix D – Table of all file types

File type	File type identifier / file name	Source	Destination	Format	Transmission path	Change request required?
Trajectory Request (TRR)		Exp.	RSOC		e-mail	no
Orbiter/Lander Instrument Pointing Request	OIPR	Exp.	RSOC	PTR	ftp to rodds	no
Pointing Request	PTR_	RSOC	RMOC + Exp.	PTR	ingest into DDS	no
Pointing Request	PTR_	RSOC	Exp.	PTR	ingest into and request from DDS	no
Pointing Request - Preliminary planning file	PTRP	RSOC	RMOC + Exp.	PTR	ingest into DDS	no
Pointing Request - Preliminary planning file	PTRP	RSOC	Exp.	PTR	ingest into and request from DDS	no
Orbiter Instrument Operations Request	OIOR	Exp.	RSOC	ITL	ftp to rodds	no
Expedite Command File - Experimenter input	ECFP	Exp.	RSOC		ftp to rodds	no
Expedite Command File	ECF_	RSOC	RMOC		ftp to rodds	no
Power Profile	PP__	Exp.	RSOC	ASCII	ftp to rodds	no
Data Volume Profile	DVP_	Exp.	RSOC	ASCII	ftp to rodds	no
Observation Request	OBR__PInRSO_D_scen_iinn_<short_name>_Vnnnn.doc	Exp.	RSOC	Word	e-mail	no
EDF model of a User Defined Procedure	UDP_	OSIRIS	RSOC	ASCII	ftp to rodds	DCR to SR UM
Lander Operations Plan	LOP_	LCC	RSOC	ASCII	ftp to rodds	no
Lander Operations Request	LOR_	LCC	RSOC	POR	ftp to rodds	no
Lander parameter information		LCC	RMOC	Word, PDF, ASCII	TBD	no
Receipt Acknowledge	ACKN	RSOC	Exp.	XML	ftp to Exp. server	no
Science Activity Plan	RO-SGS-PL-xxxx_I_R_<Short title>.<doc|pdf>	RSOC	Exp., RMOC	Word or PDF	Livelink	no

File type	File type identifier / file name	Source	Destination	Format	Transmission path	Change request required?
Master Science Plan	MSP_	RSOC	Exp.	Word or PDF (zipped)	ingest into and request from DDS	no
Master Science Plan	MSP_	RSOC	RMOC	Word or PDF (zipped)	ingest into DDS	no
Payload Operations Request	POR_	RSOC	RMOC	POR	ingest into DDS	no
Payload Operations Request	POR_	RSOC	Exp.	POR	ingest into and request from DDS	no
Payload Operations Request - Preliminary planning file	PORP	RSOC	RMOC	POR	ingest into DDS	no
Payload Operations Request - Preliminary planning file	PORP	RSOC	Exp.	POR	ingest into and request from DDS	no
Conflict file	CONF	RSOC	Exp.	ASCII	ingest into and request from DDS	no
Reference Pointing Information	RPI_	RSOC	Exp.	ASCII	Livelink or server at RSOC (*tbd*)	no
Reference Trajectory Information	RTI_	RSOC	Exp.	ASCII	Livelink or server at RSOC (*tbd*)	no
Reference Comet Model (RCM)	RO-SGS-??-xxxx_I_R_<Short title>.<doc|pdf>	RSOC	Exp.	Word or PDF	Livelink	no
Reference Flight Dynamics Event	RFDE	RSOC	Exp.	ASCII	Livelink or server at RSOC (*tbd*)	no
Command Sequence Update Request - FOP Change Request	CS_D	Exp.	RSOC	Word (zipped)	ftp to rodds	no
Command Sequence Update Request - EDF fragment	CS_P	Exp.	RSOC	EDF	ftp to rodds	CS_D
Command Sequence Update Request	CS_D, optional AXXSnnnZ.XLS|AXXFnnnZ.XLS	RSOC	RMOC	Word, XLS	e-mail	no

File type	File type identifier / file name	Source	Destination	Format	Transmission path	Change request required?
Memory Patch Request	MPR_	RSOC	RMOC	ASCII	ingest into DDS	no
Memory Patch Request - Experimenter input	MPRP	Exp.	RSOC	ASCII	ftp to rodds	no
Memory Dump Request	MDR_	RSOC	RMOC	ASCII	ingest into DDS	no
Memory Dump Request - Experimenter input	MDRP	Exp.	RSOC	ASCII	ftp to rodds	no
Memory Checksum Request	MCR_	RSOC	RMOC	ASCII	ingest into DDS	no
Memory Checksum Request - Experimenter input	MCRP	Exp.	RSOC	ASCII	ftp to rodds	no
Consolidated Scenario Parameter List (CSPL)	RO-SGS-LI-xxxx_I_R_<Short title>.<doc|pdf>	RSOC	RMOC, Exp.	Word or PDF	Livelink	no

9. Appendix E - Guide to the Database Change Request Form

The Database change request form consists of 5 main fields namely References/approval, Telemetry, Telecommand, Display and Sequence. The Sequence field is for ESOC internal use only, Sequence updates being covered by the FOP update request form (see separate section).

The PI team needs to fill in the following fields

1) REQUESTED BY – this should indicate the Experiment name and person within the team raising the request.
2) DATE
3) ORIGINATOR REF. – The structure of this reference is left open to the experiment to decide, but it must be unique, for example ESOC uses the initials of the originator + a running number to be incremented with each new request
4) ATTACHMENT – indicate if any further files are included with the DCR e.g. XL sheets
5) Select area for which update is applicable i.e Telemetry, Telecommand or Display (AND/GRD) and indicate whether update is NEW, a MODIFICATION to existing Database entries or DELETION of existing Database entries
6) Select relevant boxes within the selected area to further filter the area of the change.
7) DESCRIPTION – full details of the change that is required.

The final field of the form concerning implementation is for ESOC internal use.

10. Appendix F: Notes for filling out the Observation Request template

Guidelines for OBR Initial Use

01 - save template
02 - update filename according to filename conventions (see section 3.2.1.7.2)
03 - open file
04 - update header
- double-click on header to open it
- update [Scenario] in header
- update filename in header: this is an auto field and is updated by highlighting and pressing F9
- close header
05 - update OBR Filename field in table 1: this is an auto field and is updated by highlighting and pressing F9
06 - fill out fields with [] only
- state negative requirements where applicable with "N/A" or "None" (i.e. no fields left blank or with txxcxxfxx code)
- delete the appropriate sections if pointing is not required
- in data volume values anything under 0.001 MiB can be considered negligible
07 - deliver file via e-mail to RSOC
- once delivered the file should be frozen by PI until comments are returned by RSOC Auto Process
- It is important not to delete [] symbols and to write between them. These are bookmarks that can be used to update the MSP automatically.
- If [] are deleted by accident, leave as is and do not attempt to correct them. RSOC shall correct in this case.

Guidelines for OBR Revision

01 - update version number in the filename
02 - open file
03 - update filename in header (see above)
04 - update OBR Filename field in table 1 (see above)
05 - fill out "Revision History" table
06 - make your changes in the document

Template Fields

When preliminary OBRs are used as top-level operations requests, only the fields marked by * are required. For complete OBRs all fields must be filled in.

Table 1: Overview

OBR Filename: OBR__PlnRSO_D_SCEN_iinn_<SHORT_NAME>_Vnnnn.doc
- this is an auto field and is updated by highlighting and pressing F9
- the current filename is the source
- this filename also appears in the header

Observation Mnemonic
- mnemonic given to observation
- usually provided in current filename
- form iinn where ii is the instrument acronym (AL for ALICE) and nn is sequential numbering

Instrument/Sensor
- instrument (ALICE) or sensor (RPC/MAG)

Description
- brief description of the observation

Objectives
- objectives of the observation

CPPCR Reference
- corresponding requirement or open issue in RO-SGS-PL-0001, Rosetta Cruise Phase Payload Checkout Requirements

Duration
- total duration of the observation
- excluding set-up and run-down
- breakdown of the duration is permitted

Interactivity/Monitoring
- indicate if interactivity and/or monitoring pass is required
- state duration of the total that is dedicated to interactive and/or monitoring activities

Pointing Overview
- brief description of pointing required

Boresight Name
- boresight name defined in RO-EST-TN-3305, Payload Boresight Alignment Details

Target Type
- target type, e.g. planet, calibration star

Max Power Estimate (W)
- estimate of maximum power that is required at any time during the observation
- one value only

Data Volume Estimate (MiB) by Type:

Cat. 4 Housekeeping (3,25)
Cat. 7 Progress and Event Reports (5,1) & (5,2)
Cat. 7 Memory Check Reports (6,10)
Cat. 9 Memory Dump Reports (6,6)
Cat. 12 Science (20,3) & (20,13)
Other Data Types (e.g. Philae ESS events)
- estimate of total data volume production by data type
- provide data volumes in MiB, see IEEE 1541 standard
- any value below 0.001 MiB is considered negligible and can be stated as such, "Negligible"

Table 2: Revision History

Date
- date of revision
- form dd-mmm-yyyy

Version
- version number

- form Vnnnn

Updates

- description of updates that have been made since last version

Table 3: Target Details

In this table provide a list of desired targets in priority order. Note only one target type is expected.

Target Name

- target name

Coordinate System or Catalogue

- name of coordinate system or catalogue used for values given

Longitude or RA

- target longitude or right ascension value in decimal degrees

Latitude or DEC

- target latitude or declination value in decimal degrees

Priority

- which target is the most to least preferable
- number ordered with 1 having the highest priority
- targets with equal priority can have the same priority number
- only the top priority 1 target is listed in the MSP

Repetition

- how many times should the described pointing be repeated on this target

Additional Description

- any additional description

Table 4: Science Constraints

Constraint

- state constraints like: distance to target, illumination conditions (solar elongation, phase angle, zenith angles of sun and s/c) or repetition frequency

Minimum Value

- minimum value for the constraint

Maximum Value

- maximum value for the constraint

Requirement

- description of requirement

Comments

- any supporting comments

Table 5: Services

Service types are provided in this table; requirements and comments to those requirements are expected.

Service 19

- indicate whether service should be "enabled", "disabled" or "don't care"
- include distributing instruments & data types

Downlink of Special File Types

- N/A for Science, Housekeeping, Progress and Event Reports, Memory Check Reports

Special Downlink Priorities

- list file types with priorities

Flight Rule Checking Different from Default

- state and, if necessary, describe flight rule
- flight rule enabled or disabled during time frame
- only list deviations from default application of flight rules

Table 6: Special Operational Constraints

Constraints are provided in this table; requirements and comments to those requirements are expected. Additional constraints can be added to the table if required.

Order/Timing

- state observation order rules and number rules accordingly

- e.g. [01] AL03 must be executed before AL04
- do the same for time separation rules
- e.g. [02] AL04 must be executed 2 weeks after AL03
- several rules can be written in the same field

GO/NOGO Decision

- state whether a GO/NOGO decision is required for one observation depending on the results of the execution of previous observations
- state which data from the previous observations are needed to make the GO/NOGO decision, e.g. housekeeping only or science as well
- state how much time is needed to make the GO/NOGO decision after the data of the previous observations are available

Conflicts

- unmodelled interference or pointing
- e.g. no operation of VR coolers or no s/c movement
- if none are given then parallel operations by other experiments and pointing may be scheduled

Special Environment or Spacecraft Constraints if Different from Standard UM

- state any additional special environment or spacecraft constraints
- e.g. no RPC/IES operations in the radiation belts

Initial Configuration

- expected configuration before set-up

Set-Up Duration

- total set-up duration required before ops begins

Run-Down Duration

- total run-down duration required after ops ends

Final Configuration

- expected configuration after run-down

Temperature (K) if Different from Database Limits

- only specify if different from database limits

Wheel Off-Loading

- configuration of instrument required during s/c wheel off-loadings

Table 7: Scan/Raster Description

We define pitch/yaw/roll differently than used by pilots.

For the definition of pitch/yaw and the rotation axes see SOP-RSSD-SP-002, EPS PTR Software Specification Document, sect. 2.2.3.

Specify the pointing directions of the selected boresight relative to the fixed object in the sky. Do NOT specify the positions of the object in the field of view of the instrument.

Use this table to specify the numbers. Do not repeat the numbers in the sketch (Diagram section below), but use the symbols listed here.

Listed below is a description of each pointing parameter. Minimum and maximum values should be listed if applicable.

S_pitch

- total size of scan/raster area in pitch (deg)

S_yaw

- total size of scan/raster area in yaw (deg)

P_pitch

- offset of target from centre of scan/raster area in pitch (deg)

P_yaw

- offset of target from centre of scan/raster area in yaw (deg)

N_pitch

- number of tracks/points in pitch

N_yaw

- number of tracks/points in yaw

D_pitch

- distance between tracks/points in pitch (deg)

D_yaw

- distance between tracks/points in yaw (deg)

t_dwell
- dwell time at each raster point

V
- speed along each scan track

t_slew
- time between tracks/points
- within this time Flight Dynamics is free to schedule the slew from one track/point to the next

φ_roll
- roll angle about pointing axis (deg)
- default is that there is "no constraint" as this is usually pre-determined by solar array illumination constraint

Table 8: Diagram

Observation Mnemonic (linked to Table 1)
- this is an auto field and is updated by highlighting and pressing F9
- the observation mnemonic field in Table 1 "Overview" is the source

Sketch of the Pointing Geometry
- Draw the pointing directions of the selected boresight relative to the fixed object in the sky. Do NOT draw the positions of the object in the field of view of the instrument.
- Use this sketch to illustrate the table (Scan/Raster Description section above). Do not repeat the numbers, but use the symbols listed above.
- Indicate the names of the pointing events you are using (Pointing Details section below) in the sketch.

S/C Axes
- **we define pitch/yaw/roll differently than used by pilots**
- for the definition of pitch/yaw and the rotation axes see SOP-RSSD-SP-002, EPS PTR Software Specification Document, sect. 2.2.3
- use the provided default axes diagram to indicate the relationship between the s/c axes and the sketch

Table 9: Pointing Details

This table collects the requested pointing events, and requires pointing type, pointing axis, and existing event ± relative start/end or absolute time.
- Define your pointing events here and give timing constraints. You are free to invent your own event names, RSOC will assign the official event names during the consolidation process.
- this is closely linked to ITL contents

Table 10: Operations Overview

Description of Operations
- Provide a verbal description of your experiment operations. Details are only expected in the ITL.

FOP Reference
- reference to TC sequences or FOP procedures that are essential to these operations

Pointing & Geometric Events
- Define the geometric events you require. Describe how your operations are linked to pointing and geometric events.

Table 11: References

References RD01-03 are already listed as default.

Reference Number
- list references required with RDxx label

Description
- e.g. document number and title