European Space Agency
Research and Science Support Department
Planetary Missions Division

VEX

VSOC-to-PI
Interface Control Document
VEX-RSSD-IF-0002

Issue 2.4

14 February 2007

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Approved by: D. Koschny

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VIRTIS Principal Investigator		G. Piccioni
VMC Principal Investigator		W. Markiewicz
VEX Project Scientist		H. Svedham

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CHANGE RECORD SHEET

Date	Iss.	Rev.	pp .	Description/Authority	CR No.
23 Oct 2004	D	-	All	First release	-
02 Nov 2004	D	A	All	continue	-
14 Mar 2005	D	d	All	Comprehensive update	-
26 May 2005	1	-	-	First approved issue	-
30 Nov 2005	1	1		PI contact info, POR naming convention, file transfer methods	-
15 May 2006	2	0		Added section, Overview of Operational Constraints	
				Added section on use of MAPPS	
				Updated PIOR verification process for e-mail file verification	
			ii	VEX Project Manager removed from signature list and responsibilities	
				Add section in PMRQ so that PIs know that they can add comments into the file, to track their changes. Should also update the file name in the header, from PI0 to PI1 (for example)	
				Updated naming convention for PMRQ, adding e-mail verification process if file OK.	
			1	Removed references to mission phases already executed.	
				Included VSOC and instrument team activity schedule information.	
				References to SAP 1A/1B/2A/2B versions deleted.	
				File naming conventions for ITL and PTR updated. File content examples removed, with reference to file locations in VEX_SO where examples can be viewed.	
				Modified references to TLIS files.	
				Updated LTP diagram	
16 June 2006	2	1	All	Updated Structure	
				Merged clarification emails and appendices in document	
				Added Event File Description	
				Add MAPPS section with more detail on MAPPS	
				Added MTP telecom description and Agenda in Appendix	
20 Sept 2006	2	2	23	Added VSOC web information	
			23.4	Added SOIR pointing file requirement.	
20 Nov 06	2	3	8	Corrected spelling of Mr. Markiewicz's name	
			21	Added section on L1b Calibration Support Products	
			21	Added information to Overview Of Operational Constraints regarding minimum pointing time and process required for shorter pointings when required.	
			7	Updated VMOC Personnel, Mission Manager	
			13	MAPPS Input Files section updated	
			-	General editing to improve readability	
			17	Updated Event File naming convention	
			-	Updated Operational Orbit command file start to VAPO – 6 hours, wherever mentioned	

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Date	Iss.	Rev.	pp .	Description/Authority	CR No.
			33	Updated MTP Telecon agendas	
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			6	Removed Instrument Responsible Engineers section	
14 Feb. 07	2	4	31.1 (p.82)	Update VEX_SO delivery section with latest CVS connection and CVS Update Special procedure for Updating tagged files.	

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

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Gelöscht: 0
Gelöscht: 15
Gelöscht: May

TABLE OF CONTENTS

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

LIST OF FIGURES

LIST OF TABLES

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1 INTRODUCTION

1.1 Purpose of this document

The purpose of this document is to specify the planning and routine (operational) commanding interfaces and procedures between SOC and the VEX instrument teams, for all interfaces and procedures that are required to support VEX science operations.

There are two areas of SOC operations support:

(a) *Planning*. SOC will assist the instrument teams via the SOWG in the preparation of the Science Activity Plan (SAP), and all the planning and preparation files. SOC will prepare the Medium Term Planning (MTP) assessment until approval by the MOC. This spacecraft timeline of instrument activities will be free of resource constraints and be the input for the SOC commanding activities.

(b) *Commanding*. During all payload commanding periods, create schedules for each instrument, for each commanding period, and convert those schedules into command sequences agreed to between the instrument teams and the MOC. The command schedules will be extracted from MTP plans which have been verified to be free of resource conflicts and derived from the relevant SAP. The command schedule for each instrument will be iterated by SOC with the instrument teams during the commanding cycle to modify, add, or delete command sequences and parameter values. Once the instrument teams have approved the schedule for the current Commanding Period, SOC will create the coordinated payload commands required by the MOC.

The interfaces addressed in this document include:

- The generic interfaces required to support the above functionality.
- Any instrument-specific interfaces required to support the above functionality.
- Testing of the interfaces.

1.2 Experiments

Throughout this ICD the two character abbreviation of the instrument names specified in AD 09 are used. In cases where experiment names are used in file names, the default experiment names are also provided. These have the values as shown in Table 1.

Table 1: Instrument Types, Names, Abbreviations.

Instrument Type	Instrument	Abbrv.	Name String
Remote sensing experiments	VIRTIS	VR	virtis
	SPICAV	SI	spicav
	PFS	PS	pfs
	VMC	VV	vmc
Plasma analysing experiments	ASPERA	AS	aspera
	MAG	RP	mag
Radio Science	VeRa	TV	vera

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Gelöscht: 15
Gelöscht: May

1.3 Applicable Documents

The following documents are *Applicable Documents* for the SOC-to-PI ICD. They provide further supportive information, and may also contain high level requirements. The high level requirements may constrain the operation of the SOC interfaces as specified in this document, or could be in conflict with that specification. Such conflicts shall be resolved by the VSOC Manager or, if necessary, by the VEX Project Scientist.

AD 01 VEX-RSSD-SP-001, VSOC Design Specification
AD 02 VEX-ESC-IF-5004, Command Request Interface Document (CRID)
AD 03 VEX-ESC-IF-5003, Data Distribution Interface Document (DDID)
AD 04 VEX-ESC-IF-5005, SOIA Appendix D, VSOC-to-FDT ICD
AD 05 VEX-ESC-RS-5007, Operations Rules and Constraints Document
AD 06 VEX-ESC-TN-5600, Mission Planning Concept
AD 07 VEX-RSSD-PL-002, VEX Science Activity Plan
AD 08 VEX-RSSD-PL-004, VEX Science Planning and Commanding Scenario
AD 09 VEX-ESC-PL-5107, VEX FOP Production Plan
AD 10 Instrument Flight User Manuals
AD 11 Science Operations Implementation Agreement (SOIA), VSOC-to-VMOC ICD
AD 12 VEX-RSSD-SCH-004, Routine Science Operations Schedule
AD 13 VEX-RSSD-PO-001_7_-_VEX_Science_Overview_2006May22.pdf
AD 14 VEX-RSSD-PO-020_6_-_Routine_Science_Planning_Concept_2006May22.pdf
AD 15 VEX-RSSD-TN-014_D_-_MAPPS_Configuration_2006may15.doc

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1.4 Reference Documents

The following documents are *Reference Documents* for the VSOC-to-PI ICD. They provide further supportive and background information, but are neither superior nor inferior to this document. In particular, the resolution of any disagreement between this document and the Reference Documents is to be pursued elsewhere.

RD 01 MAPPS User Manual (TBW)
RD 02 SOP-RSSD-SP-002, PTR Software Specification, 2004Nov05
RD 03 SOP-RSSD-IF-001, EPS Interface Control Document File Syntax Definition
RD 04 VEX-RSSD-PL-0001, VEX Archive Generation, Validation and Transfer Plan
RD 05 VEX-RSSD-PO-020, Planning File schedule and names

1.5 Abbreviations and Acronyms

ASPERA	Plasma Analyzer and energetic neutral atom imager (MEX heritage)
CEB	Cebreros ground station
CRID	Command Request Interface Document
CVP	Commissioning and Verification Phase
CVS	Concurrent Versioning System, the VSOC configuration management software
DDID	Data Distribution Interface Document
DDS	Data Disposition System
DHAG	Data Handling and Archiving Group (at ESA/RSSD)
DHS	Data Handling Scientist
DOY	Day of Year
DSN	Deep Space Network, the American ground station network consisting primarily of three downlink sites at Goldstone, California; Canberra, Australia; Madrid, Spain.
EDF	Experiment Description File
EFOR	Experiment Flight Operations Readiness review
EOL	End of Life
EPS	Experiment Planning System
ESA	European Space Agency
ESAC	European Science and Astronomy Centre, near Madrid, Spain
ESAF	ESTRACK Station Activity File, which contains VEX ground station activities and CEB

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Gelöscht: May

	maintenance periods
ESOC	European Space Operations Centre, in Darmstadt, Germany
ESTEC	European Space and Technology Centre (in Noordwijk, The Netherlands)
EVF	Pointing Event File
FCP	Flight Control Procedure
FDT	Flight Dynamics Team (at SOC)
FECS	Flight Events and Communications Skeleton
FOP	Flight Operations Plan
FOV	Field of View
FSC	FDS SOC Constants File
FTL	Flight Dynamics Timeline
FTS	File Transfer System
FUM	Flight User Manual
GDS	Goldstone ground station, California, part of the DSN
GSM	Ground Segment Manager (at ESOC)
IBAT	Instrument Baseline Activity Transitions
ICD	Interface Control Document
I/F	Interface
INERT	Pointing mode: Inertially fixed pointing
IMU	Inertial Measurement Units
INSLW	Pointing mode: Slewing between two inertial positions
ITL	Input Timeline (a file syntax to describe experiment operations)
LEOP	Mission phase: Launch and Early Orbit Phase
LTEF	Long-term events file
LTOF	Long-term orbit file
MAG	Magnetometer
MAPPS	Mapping and Planning Software
MEX	Mars Express
MOC	Mission Operations Center (for VEX, synonymous with the VMOC)
MPS	Mission Planning System (at MOC)
MSP	Master Science Plan
MTP	Medium Term Plan
NADIR	Pointing mode: Nadir pointing
NNO	New Norcia ground station
OCM	Orbit Correction Maneuver
OFPM	Operations File Push Mechanism
OLP	ORF-A Logging Program
ORCD	Operations Rules and Constraints Document
ORFA	Operations Request File Acknowledger
PFS	Planetary Fourier Spectrometer
PI	Principal Investigator
PIOR	PI Operations Request file
PMRQ	PIOR Modification Request file
POR	Payload Operations Request
POS	Payload Operations Service
PSA	Planetary Science Data Archive (at ESA/RSSD)
PSWT	Post-Slew Wait Times
PTB	Project Test Bed
PTR	Pointing Request File
RAB	Resource Allocation Board
RSSD	Research and Scientific Support Department
S/C	Spacecraft
SAP	Science Activity Plan
SCT	Spacecraft Control Team (at SOC)
SEF	Slew Event File
SOC	Science Operations Center (for VEX, synonymous with the VSOC)

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Gelöscht: 15
Gelöscht: May

SOIA	Science Operations Interface Agreement (SOC-MOC ICD)
SOIR	High Resolution Solar Occultation Channel. Part of SPICAV.
SOPM	Science Operations for Planetary Missions (at ESA/RSSD)
SOT	Science Operations Team
SOWG	Science Operations Working Group
SPICAV	UV & IR atmospheric spectrometer for solar/stellar occultations and nadir observations
SPICE	A NASA information system that assists scientists and engineers involved in space-based observations and operations. SPICE data sets are composed of the S, P, I, C, and E Kernels. More information available at: http://naif.jpl.nasa.gov/naif/spiceconcept.html.
SPL	Scenario Parameter List
SWT	Science Working Team
TBC	To be confirmed
TBD	To be determined
TBS	To be supplied
TBW	To be written
TC	Telecommand
TM	Telemetry
TMSS	Trajectory Maneuver Slot Schedule
UCAF	User Custom Attitude File
VeRa	Venus Radio Science experiment (Rosetta and MEX heritage)
VESOR	VEX Science Operations Requests (form sheet)
VEX	Venus Express
VIRTIS	Venus Express Infrared Spectrometer
VMC	Venus Monitoring Camera
VMIB	Venus Express Mission Implementation Base (database)
VMOC	Venus Express Mission Operations Control Centre, ESOC
VOI	Venus Orbit Insertion
VSDB	VEX System Data Base (stores all VEX TC sequences and telecommands
VSOC	VEX Science Operations Centre (ESTEC)
WOL	Reaction Wheel Offloading
Xfr	transfer

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2 Operational Schedules

The details of the operational schedule and deadlines between SOC and MOC have been agreed and are fully documented in the FOP. The schedule and the deadlines described there has lead to a schedule and set of deadlines between SOC and the instrument teams which are found in the Routine Science Operations Schedule (AD 12), available on LiveLink at *LiveLink/ LiveLink (online)/Enterprise Workspace/ Repositories/Solar System Science Operations/Venus Express/07 VSOC Documents/Schedules (SCH)*.

3 Source of Instrument Specific Information

The Operations Rules and Constraints Document (AD05), together with the Instrument Flight User Manuals (AD10), will be the primary route through which instrument-specific inputs for mission operations are transferred to the SOC.

Any variations from that route shall be explicitly stated in this document. Such variations may arise, for instance, from the need to handle rapid changes during mission operations, or the convenience to instrument teams, SOC, and MOC of handling certain interfaces in computer form.

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4 Roles and Responsibilities

4.1 Overview

After successful separation of the spacecraft from the launcher, MOC assumed operational responsibility for the mission. After successful commissioning, the PS and the PM transferred overall responsibility of the mission to the Mission Manager located at RSSD. The operational responsibility is delegated to the SOM at the MOC.

SOC will generate the plans and the command requests for:

- science operations,
- instrument maintenance operations,
- on-board software patches for instruments,
- and updates of instrument operational databases and documentation for the routine phase of the mission.

All SOC inputs to MOC will be under responsibility of the PS.

The PS or his representative will provide support on conflict resolution between different science objectives and approve all inputs generated by the SOC for MOC operational implementation.

4.2 SOC

During the pre-routine phase the SOC is responsible for defining and requesting all relevant information required from the instrument teams in order to build the SOC command structures for all instruments. During the routine phase, and on behalf of the VEX Project Scientist, the SOC is responsible for the correctness and completeness of all science operation inputs required by the MOC for the mission planning activities for the instruments. In particular, all activities concerning scientific co-ordination of the payload operations schedule and conflict resolution with science operations are SOC responsibility.

Specifically, SOC has responsibility for:

Pre-Routine Phase

1. Understanding details of each instrument's operation – from Flight User Manual, meetings, e-mail exchanges, *etc*.
2. Taking the lead in building and validating the IBAT command files and VMIB EDF files for all instruments.
3. Participation in interface testing.

Routine Phase

1. supporting and coordinating the planning activities of the VEX instrument teams in the preparation of science operations for their instruments
2. providing planning and commanding information to the PIs
3. generating and disseminating instrument command schedules (the PI Observation Request, or PIOR) to the instrument teams
4. receiving and processing requests from PIs to modify their instrument command schedule (the PIOR Modification Request, PMRQ)
5. iterating this PIOR/PMRQ process as necessary within the published schedule
6. Performing power usage and data volume constraint checking
7. producing a consolidated instrument payload schedule (that is, PORs) and transferring these to MOC
8. iterating, as necessary, the instrument payload schedule with MOC and the PIs to resolve inconsistencies
9. receiving, and validating, requests from the PIs to modify their operational database entries and forwarding to MOC
10. receiving, and validating, memory patch requests from the PIs and forwarding to MOC

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Gelöscht: 15
Gelöscht: May

11. maintaining its own commanding database in consultation with the instrument teams
12. coordinate and validate the PTR generation process
13. iterate with FD and PI teams on the PTR to resolve inconsistencies

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4.3 Instrument teams

During the pre-routine phase, the PIs are responsible for providing the SOC with all requested information and to participate in the building of the SOC command and database structures for their instrument. During the routine phase, the PIs are responsible for planning the activities of their instruments within the constraints of the overall VEX science plan and for ensuring that the instrument payload schedule prepared by SOC is consistent with those plans and constraints.

Specifically, the PIs have responsibility for:

Pre-Routine Phase

1. provision to SOC of details of their instrument's operation – from FUM, meetings, e-mail interchanges, etc.
2. participate in the building and validating of SOC command and database structures for their instrument
3. participation in interface testing.

Routine Phase

1. preparing, supported by SOC, the VEX Science Activity Plan (SAP)
2. provision of dedicated people within each PI Team who have formal responsibility for the operation of the SOC/PI interface
3. receiving and validating the planning and commanding information provided by SOC
4. provision and revision of PI Supplementary Inputs, as required, in a timely manner
5. receiving PIORs from SOC and instructing SOC as to their disposition
6. generating PMRQs as necessary and forwarding them to SOC
7. iterating this PIOR/PMRQ process as necessary within the published schedule
8. responding to requests from SOC to resolve inconsistencies or constraint violations detected by MOC's processing of the consolidated payload schedule
9. provision to SOC of requests to modify their operational database entries
10. provision to SOC of memory patch requests
11. provision to SOC of necessary inputs to the SOC commanding database
12. Provide inputs for PTR generation to SOC
13. Provide Experiment Operational inputs for Medium Term Plan generation

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5 VEX Mission Manager

The VEX Mission Manager (MM) is Frederic A. Jansen [fjansen@rssd.esa.int], who is located at ESTEC. His phone number is +31-71-565-4426.

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6 VSOC Personnel

Table 2: SOC Key Personnel

Name	Position	Phone number
Håkan Svedhem	Project Scientist	+31-71-565-3370
Detlef Koschny	Planetary Science Operations Manager	+31-71-565-4828
Raymond Hoofs	Science Operations Engineer	+31-71-565-3440
Donald Merritt	Science Operations Engineer	+31-71-565-8183
Federico Nespoli	Science Operations Engineer	+31-71-565-8828
Miguel Pérez Ayúcar	Science Operations Engineer	+31-71-565-6214

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Arjan Hulsbosch	Science Operations Software Engineer	+31-71-565-8626
Joe Zender	Planetary Data Archiving Manager	+31-71-565-4919
Jose Luis Vázquez-García	SPICE support/Data Handling Engineer	+34-91 81 31310
Maud Barthelemy	Planetary Data Archiving Engineer	+34 91 8131 248

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6.1 SOC E-mail

Mail sent to individuals in the SOC Team should be sent via the Internet to the ESA central name server from where it will be forwarded automatically to that individual. Use Internet addresses of the form

`firstname.lastname@esa.int`

where `firstname` is the first name of the individual, `lastname` the last name of the individual. For example `Detlef.Koschny@esa.int`.

Operational messages to SOC should be sent to the general SOC address to ensure it is received in a timely fashion. All time-critical messages (*e.g.* problem reports, status reports or planning files) shall be sent to the SOC operational account, with the generic address:

`vsoc@rssd.esa.int`

Mail sent to the VSOC address is forwarded to the Project Scientist, the Planetary Science Operations Manager and all the science operations engineers.

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6.2 SOC Mailing Address

Postal mail should be sent to the attention of the Planetary Science Operations Manager at following address:

Detlef Koschny
ESA/ESTEC, SCI-SO
Keplerlaan 1, Postbus 299
NL-2200 AG, Noordwijk

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7 VMOC Personnel

Table 3: VMOC key personnel.

Name	Position	Phone number
Paolo Ferri	VEX Ground Segment Manager	+49 (0)6151 90 2332
Octavio Camino	VEX Spacecraft Operations Manager	+49 (0)6151 90 2799
Vicente Companys	VEX Flight Dynamics Coordinator	+49 (0)6151 90 3004

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8 Instrument Team Personnel

The PI shall provide SOC with the name, e-mail address, telephone and fax number of each person who undertakes those operational responsibilities covered by this ICD. Routine changes to this information should be provided to SOC at least 5 working days in advance. This person, or persons, shall be responsible for all activities ascribed to the PI Team in subsequent Sections of this document.

Table 4: PI Team Contact Information

ASPERA	
PI Name	Stas Barabash

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Gelöscht: May

PI E-mail Address	stas@irf.se
Operational E-mail Address	aspera_ops@rssd.esa.int
Telephone Number	+46 9807-9122
Fax Number	+46 9807-9050
Mailing Address	Swedish Institute of Space Physics PO Box 812 SE-981 28 Kiruna SWEDEN

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MAG	
PI Name	Tielong Zhang
PI E-mail Address	tielong.zhang@oeaw.ac.at
Operational E-mail Address	mag_ops@rssd.esa.int
Telephone Number	+43-(0)316 4120 552
Fax Number	+43-316-4120590
Mailing Address	Space Research Institute Schmiedlstrasse 6 8042 Graz Austria

PFS	
PI Name	Vittorio Formisano
PI E-mail Address	vittorio.formisano@ifsi.rm.cnr.it
Operational E-mail Address	vex_pfs_ops@rssd.esa.int
Telephone Number	0039 06 4993 4362
Fax Number	0039 06 4993 4074
Mailing Address	IFSI-CNR Tor Vergata Via del Fosso del Cavaliere I-00133 Roma ITALY

SPICAV/SOIR	
PI Name	Jean-Loup Bertaux
PI E-mail Address	bertaux@aerov.jussieu.fr
Operational E-mail Address	spicav_ops@rssd.esa.int
Telephone Number	+33-(0)1 64 47 42 51
Fax Number	+33-(0)1 69 20 29 99
Mailing Address	Service d'Aéronomie du CNRS BP 3 F-91371 Verrières-le-Buisson FRANCE

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

VeRa	
PI Name	Bernd Häusler
PI E-mail Address	Bernd.Haeusler@unibw-muenchen.de
Operational E-mail Address	vera_ops@rssd.esa.int
Telephone Number	+49-89-60042138
Fax Number	+49-89-60042138
Mailing Address	Institut für Raumfahrttechnik Universität der Bundeswehr München, Werner-Heisenberg-Weg 39 85577 Neubiberg

VIRTIS	
PI Name (Operations contact)	Giuseppe Piccioni
PI E-mail Address	giuseppe.piccioni@rm.iasf.cnr.it
Operational E-mail Address	vex_virtis_ops@rssd.esa.int
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Co-PI Mailing Address	Laboratoire d'Etudes Spatiales et d'Instrumentation en Astrophysique, Observatoire de Paris 5 place Jules Janssen 92195 Meudon CEDEX FRANCE

VMC	
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PI E-mail Address	markiewicz@linmpi.mpg.de
Operational E-mail Address	vmc_ops@rssd.esa.int
Telephone Number	+49-5556-979-294
Fax Number	+49-5556-979-240
Mailing Address	Max-Planck Institut für Sonnensystemforschung Max-Planck-Strasse 2 D-37191 Katlenburg/Lindau

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Gelöscht: May

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9 VEX Project Office

The VEX Project Office has been closed. Table 5 gives the names of who were the key Venus Express Project Office personnel.

Table 5: Former VEX Project Office Key Personnel

Name	Position	Phone number
Donald McCoy (SCI-PE)	Project Manager	+31-71-565-3524
Philippe Sivac (SCI-PE)	Principle Systems Engineer	+31-71-565-4995
Hans Eggel	Payload Manager	+31-71-565-3465

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10 Communications

10.1 Information Exchange

Any exchange of technical information on interfaces, and operations between the instrument teams and the SOC, shall be copied to the VEX Project Scientist and the Planetary Science Operations Manager. Mail messages sent to the VSOC group mailing address automatically meets this requirement. Electronic mail, with fax as a back-up, shall be used for short memos and notes. For larger documents, submission will be in electronic format (PDF or MS Word, with Word preferred) with one hardcopy via express mail on request.

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10.2 Meetings

- The SOC will organize the regular Science Operations Working Group (SOWG) Meetings and participate in Science Working Team (SWT) meetings.
- SOC will also participate in other meetings called for specific purposes relevant to the instrument teams. These may be meetings involving one, several or all instrument teams.
- SOC will set up and chair specific meetings between itself and individual instrument teams to address specific interface issues. MOC will be invited to all these meetings. Co-location of these meetings with ESOC-Instrument Team meetings will take place whenever possible.
- SOC will organize weekly planning telecom meetings in order to co-ordinate the Medium Term Planning Process

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11 Interface Characteristics

Files are passed in both directions between SOC and the Instrument Teams. Although e-mail, fax and telephone are also part of the communications interface between the SOC and the Instrument Teams, the main transfer mechanism will be file transfer over the public internet.

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11.1 Computer Platforms

11.1.1 SOC

The operational computer facilities of SOC, sited at ESTEC, are Sun platforms running the Solaris Unix operating system and Personal Computers running the Windows operating system. SOC databases will be kept as ASCII files in CVS and MySQL.

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Gelöscht: May

11.1.2 The instrument Teams

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The computer facilities of the instrument teams are not directly related to this interface, with the exception of the use of MAPPS at the instrument team sites. MAPPS is supported for execution on PC/Windows or Sun/Solaris. It is not tested on Linux or Macintosh systems.

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11.2 Interface Protocol

The network protocols supported by SOC shall be TCP/IP. As part of its security infrastructure, SOC runs TCP wrappers to stop unauthorised access. Because of this, the PIs will supply the IP addresses of all nodes from which their teams require access. This information will be obtained directly from the instrument teams.

All network interactions between SOC and instrument teams shall therefore use TCP/IP applications:

- Secure FTP for file transfer
- SSH for normal terminal access – if required (currently not foreseen)

Transfer of data files between instrument teams and SOC will be via the public Internet. Secure applications shall be used wherever practicable.

To ensure the security of the SOC computers, network access by instrument teams shall be permitted only from internet addresses provided to SOC by PIs. These addresses shall be any addresses regularly used for access to SOC, e.g. computers at the PI's home institute, EGSEs at ESOC or computers at other institutes from which the instrument team may wish to access SOC. If a PI wishes to add, change or delete items in the list of Internet addresses allowed to access SOC, they shall notify SOC formally by e-mail.

SOC shall verify the requested changes and then implement them as soon as possible.

Formatiert: Nummerierung und Aufzählungszeichen

11.3 Operational Accounts and Directories

11.3.1 PI Accounts at the SOC

All PIs have a password protected account on the SOC Planetary Science Operations computer, gorilla.estec.esa.int, with home directories for each instrument team as presented in the Table below. Each instrument team directory will contain two sub-directories:

- "`incoming`" – used for receiving inputs from the instrument teams
- "`outgoing`" – used for making SOC products available to the instrument teams

File protections will be set such that the instrument teams will be able to write/rename files in their `incoming` directory and will be able to read/delete files in their `outgoing` directory. No additional access to these PI accounts will be granted. Each PI will be able to set and change the password on their account.

Details of these two operational directories are given in the Sections below.

Table 6: Directories of PI teams on the SOC computer.

ASPERA	`/ftp/projects/VEX/payload/ASPERA/incoming` `/ftp/projects/VEX/payload/ASPERA/outgoing`
MAG	`/ftp/projects/VEX/payload/MAG/incoming` `/ftp/projects/VEX/payload/MAG/outgoing`
PFS	`/ftp/projects/VEX/payload/PFS/incoming` `/ftp/projects/VEX/payload/PFS/outgoing`
SPICAV/SOIR	`/ftp/projects/VEX/payload/SPICAV/incoming` `/ftp/projects/VEX/payload/SPICAV/outgoing`

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VeRa	/ftp/projects/VEX/payload/VERA/incoming /ftp/projects/VEX/payload/VERA/outgoing
VIRTIS	/ftp/projects/VEX/payload/VIRTIS/incoming /ftp/projects/VEX/payload/VIRTIS/outgoing
VMC	/ftp/projects/VEX/payload/VMC/incoming /ftp/projects/VEX/payload/VMC/outgoing

For the convenience of the experimenters, shortcuts will be provided. After logging in to *gorilla.estec.esa.int* under their own account each experimenter can reach his incoming and outgoing directories directly from their home directory (marked by a tilde '~').

- ~/VEX/incoming
- ~/VEX/outgoing

Formatiert: Nummerierung und Aufzählungszeichen

11.3.2 Inputs from Instrument Teams

Electronic inputs from instrument teams, e.g. PMRQs, shall be sent as computer files using the SFTP application to the "`incoming`" sub-directory of the instrument home directory, as shown in Table 6.

The instrument team should upload the file with a ".tmp" extension added to the filename. When the upload is complete, the file should then be renamed to the original name. This procedure makes sure that the ORFA software that runs on the SOC host does not ingest a file that is in the process of being uploaded.

The name of the file shall identify its contents; the naming scheme for each class of input are defined in the appropriate Sections of this ICD.

The SOC software (ORFA) will automatically move instrument team input files from their "`incoming`" directory to the appropriate operational directory within a configurable time (~10 minutes) of their arrival at SOC. A receipt acknowledge will be sent via SFTP to the instrument team computer confirming that a file has arrived, possibly indicating errors in the file name and/or the contents of the file, depending on the file type (See Section 24).

All input files shall be in ASCII format with variable record length. ASCII input files *must not* contain tab characters. The implementation of tabs varies between different computers, so tabs cannot be used to simulate the fixed format used in, for example, PMRQ files.

The security of this input process will be founded on the careful use of the private keys which give *write* access to the instrument team accounts as shown above.

A sample upload procedure from the command line is given below. This procedure assumes that it is run from the user's home directory which contains the file to be transferred:

```
»  sftp gorilla.estec.esa.int

sftp> cd VEX/incoming/

sftp> put AS_CP0007___0061_0067__A_VS0PI1.itl file.tmp

sftp> rename file.tmp AS_CP0007___0061_0067__A_VS0PI1.itl

sftp> chmod 644 AS_CP0007___0061_0067__A_VS0PI1.itl

sftp> quit
```

Formatiert: Nummerierung und Aufzählungszeichen

11.3.3 Outputs from the SOC

Electronic outputs from the SOC to the instrument teams, e.g. PIOR files, shall be automatically uploaded ('pushed') to the instrument team. The instrument team will set up an SFTP server

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(see Section 11.3.5). Additionally an e-mail will be sent to the instrument team informing them of the arrival of a new planning file on their system.

The name of the file shall identify its contents; the naming scheme for each class of output is defined in the appropriate Sections of this ICD.

If an SFTP server is unavailable, the planning file shall be made available in the "`outgoing`" sub-directory of the instrument home directory on the SOC computer as shown in the table above. Instrument teams shall fetch these files to their own computers using the SFTP client application via their account on the SOC computer system.

Formatiert: Nummerierung und Aufzählungszeichen

11.3.4 Access to input and output directories

The access modes of the instrument team-specific directories will be set as follows:

1. the Unix owner of each instrument team directory is the PI with privileges rwx (read, write and execute);
2. the Unix group of these directories is *vex* with privileges r-x;
3. there is no Unix *world* privilege on the instrument team directory;

This ensures that users without affiliation to Venus Express will not be able to access either the "`incoming`" or the "`outgoing`" directory.

The access modes of the "`incoming`" and "`outgoing`" directories will be set as follows:

4. the Unix owner of each pair of directories is the PI with privileges rwx (read, write and execute);
5. the Unix group of these directories is *vsoc_ops* with privileges rwx;
6. there is no Unix *world* privilege on the "`incoming`" directory;
7. the Unix *world* privilege on the "`outgoing`" directory is rx (read and execute only);

This system allows files in each directory to be read and written by the owning instrument team and the SOC operational account. Files in the "`outgoing`" directory, e.g. PIORs, can be accessed by other instrument teams. The access modes of the PIOR files in the "`outgoing`" directories will be set as follows:

1. the Unix owner of each PIOR file is *vsoc_ops* with privileges rwx;
2. the Unix group of each PIOR file is *vsoc_ops* with privileges r (read);
3. the Unix *world* access privilege of r (read);

Therefore:

- the PIOR files can be written and revised only via the SOC operational account;
- SOC staff can read these files;
- an instrument team can do anything with their PIOR (read, delete, rename...) except modification.

PIs shall not change the privileges setting on these directories or on PIOR files, as the smooth flow of PIORs and PMRQs between the instrument team and SOC would be interrupted.

Formatiert: Nummerierung und Aufzählungszeichen

11.3.5 SOC Accounts On Instrument Team Computers

Each instrument team will set up a Secure FTP server. This server will fulfil two purposes:

- Receiving receipt acknowledgements (see Section 24).
- Receiving planning files that have been published by the SOC (called a 'push' of the files), so that these files don't need to be downloaded from SOC servers. This behaviour is optional.

The PI will provide the SOC with the following information:

1. The hostname of the server.
2. The username that has been assigned to the SOC on that server.

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3. The directory (either absolute or relative) that the SOC is to upload acknowledgements to.
4. The directory or directories that the SOC is to optionally upload planning files to.
5. The fingerprint (or other digest) of the host public key, which will be transferred by telephone for verification by the SOC.

The SOC will provide the PI with the following information:

1. The public key that the SOC will use for public key authentication.
2. The fingerprint (or other digest) of the public key, which will be transferred by telephone for verification by the PI.

Formatiert: Nummerierung und Aufzählungszeichen

11.4 Contingency Procedures

This Section deals with contingencies at the PI institutes or at SOC which may effect their operational capability.

Formatiert: Nummerierung und Aufzählungszeichen

11.4.1 SOC

SOC shall issue warnings of scheduled downtime on the SOC computers using electronic mail to the instrument teams and MOC. SOC shall report unscheduled downtime on the SOC computers, using e-mail, to the instrument teams and the MOC 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 ESTEC. In the unlikely event that no alternative is available, reports will be sent by fax.

Formatiert: Nummerierung und Aufzählungszeichen

11.4.2 The Instrument Teams

It is assumed that the PI Institutes have sufficient computing capacity to support their operational interface with SOC through the occasional downtime. PIs shall report scheduled and unscheduled downtime on their operational computers, using e-mail, to SOC.

Formatiert: Überschrift 2

11.5 VSOC web

VSOC publishes web pages on the internet, the "VSOCWeb", to support operations. The address where these pages can be found is: http://www.rssd.esa.int/venusexpress. To access parts of the website a personal account is required. An account can be requested from VSOC.

In the following sections, different parts of the VSOCWeb will be described.

Formatiert: Überschrift 3

11.5.1 File Tracker

The file tracker gives an overview of all files that have been transported over the automated official interfaces of VSOC, both to-and-from the instrument teams and to-and-from VMOC. This excludes files transferred by e-mail.

Upon accessing the main page a selection form appears. Select the criteria for a search through the file database and click "submit". Not all fields need to be filled out.

The resulting file list will show

Formatiert: Nummerierung und Aufzählungszeichen

- the name of the file
- the type of the file
- the instrument it applies to (if applicable)
- the date and time at which the file was ingested into the VSOC database (not CVS)
- whether the file was accepted (POR, MCR, MDR and MPR files only)
- a link to the acknowledgement for the file (if one was generated)
- a link to the log entries that were generated when the file was transferred (see section 10.5.2)

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- a link which, when clicked, displays the file (ASCII files only)
- a link which, when clicked, saves the file to your computer

Be aware that files that are transported in a container file (e.g. PORs in a PORG) will not be displayed, unless explicitly requested. The name of container files can be clicked to display information on the files in that container. Files that are rejected by ORFA are not displayed (because they are not ingested into the database), although their acknowledgements are.

If a large number of files are returned by the query, the bottom of the file list has links which can display more files.

It can take up to 30 minutes for a file that has been transferred over an interface to show up on the VSOCWeb.

Formatiert: Überschrift 3

11.5.2 Log Viewer

The log viewer can display log entries generated by several programs. Upon request of a display, the log entries are sorted by process (run), and collapsed.

Formatiert: Überschrift 3

11.5.3 Input Time Line Checker

The input time line checker will allow the upload of one file, which will be checked by EPS against the current mission database. The output of that check will then be displayed. This check is exactly the same as the one that ORFA does when handling a file.

Formatiert: Überschrift 2

11.6 LiveLink

SOC will distribute documents via the RSSD documentation server LiveLink:

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

User name is *VenusExpress_guest*; the password will be distributed by secure means

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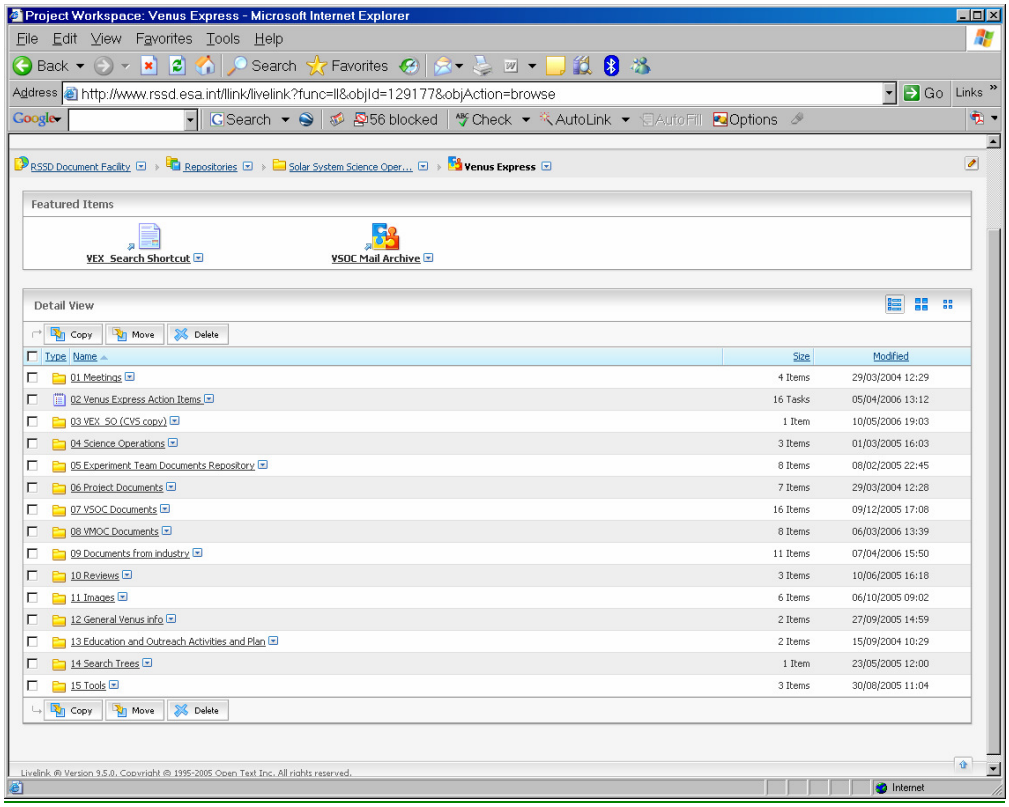

Figure 10-1 – LiveLink Top-level window for Venus Express documents

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Formatiert: Nummerierung und Aufzählungszeichen

Gelöscht: <#>Use of MAPPS¶
The Mapping and Payload Planning Software (MAPPS) is a tool written and supported by SOC to:¶
<#>Help the instrument teams plan, visualise and generate their instrument-specific SAP timeline.¶
<#>Help the SOWG produce a resource-harmonized, integrated payload operations timeline in the SAP, taking into account downlink periods, slews and MOC spacecraft maintenance activities.¶
A full description of MAPPS and how to use it can be found in RD 01 and MAPPS can be downloaded from the SOC LiveLink server (see Section 11.5). RD 01 contains the details of input and output files. [Note: until such time that RD 01 is completed, some information is provided in Appendix C.]¶
MAPPS is written in a platform independent way, using the C programming language and the Qt GUI library, and incorporates specific Fortran modules provided by the MOC Flight Dynamics Team (FDT). Because of this, SOC will only support the deployment of MAPPS on Unix platforms and PCs running a Windows system.¶

12 Support Processes

12.1 Documentation Standards

Documents written by SOC will be produced using any of the following methods

- MS-Word (SOC documents)
- MS-Excel (timelines)
- MS Project (Schedules)
- PDF files
- Plain ASCII files.

For ASCII files, the maximum line length is 80 characters; <TAB> and <LF> codes can be used to aid formatting; however, tabs should **never** be used in the operational files read by MAPPS or EPS (LTP, MTP and STP files); spaces should be used for formatting. The operational files should also use a DOS format of <CR><LF> for end-of-line characters.

SOC will accept MS-Word or PDF files from the instrument teams, but Word files are much preferred.

Documents will be interchanged between SOC and the instrument teams by one of the following methods:

- Electronic mail
- The LiveLink documentation server at http://www.rssd.esa.int/ LiveLink.
- File Transfer Protocol (FTP)

12.2 VEX Science Data Archive

The Venus Express science archive data is described by the VEX Archive Generation, Validation and Transfer Plan (RD 04) and individual instrument ICDs. The ESOC Auxiliary Data ICD (TBW) and SPICE Data ICD (TBW) will describe those interfaces.

13 MAPPS

The Mapping and Payload Planning Software (MAPPS) is a tool written and supported by SOC to:

1. Help the instrument teams plan, visualise and generate their instrument-specific SAP timeline.
2. Help the SOWG produce a resource-harmonized, integrated payload operations timeline in the SAP, taking into account downlink periods, slews and MOC spacecraft maintenance activities.

A full description of MAPPS and how to use it can be found in RD 01 and MAPPS can be downloaded from the SOC LiveLink server (see Section 1). RD 01 contains the details of input and output files. [Note: until such time that RD 01 is completed, some information is provided in Appendix C.]

MAPPS is written in a platform-independent way, using the C programming language and the Qt GUI library, and incorporates specific Fortran modules provided by the MOC Flight Dynamics Team (FDT). Because of this, SOC will only support the deployment of MAPPS on Unix platforms and PCs running a Windows system.

13.1 MAPPS versions

The MAPPS versions are provided to the instrument teams using LiveLink:

- Venus Express/15 Tools/MAPPS/MAPPS versions

VSOC will notify the instrument teams when a new version is available in LiveLink.

13.2 MAPPS configuration files

There are multiple configuration files which are used by MAPPS. All configuration files are provided by VSOC in the VEX_SO directory:

VEX_SO\MAPPS\

(1) MAPPS_RC – MAPPS main configuration file

(2) CONFIG_DATA – MAPPS configuration files for execution

(3) SCENARIOS - MAPPS scenario files

13.2.1 MAPPS main configuration file

This file, sometimes called the "settings file", contains the general MAPPS data and is loaded by MAPPS at start-up. It contains the colour coding and definition of lots of other parameters (see AD15). It is advised for instrument teams not to update this file unless specifically advised by VSOC. This file allows customizing MAPPS for the specific experiments. VSOC will soon provide the instrument teams with procedures which will allow making specific changes to this file.

This file is stored in:

C:\Documents and Settings\user\Application Data\ESA\MAPPS

Filename:

vexmappsv*nn*rc

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Gelöscht: <#>SOC-supplied Software¶ The only software to be provided by the SOC is the Mapping and Payload Planning Software (MAPPS), which will allow the instrument teams to simulate the orbit with geometrical information and instrument footprints.¶
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Gelöscht: <#>Document Dissemination¶ SOC will distribute documents via the RSSD documentation server LiveLink:¶ http://www.rssd.esa.int/LiveLink¶ **User name is *VEX_guest*; the password will be distributed by secure means.**
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where *nn* are the first two digits of the version number of the current MAPPS executable. For example, if the current MAPPS executable is version 6.3.5, the value of nn would be 63.

The "RC" file is delivered as part of the VEX_SO in the location:

C:\PTB\VEX_SO\MAPPS\MAPPS_RC

and must be copied by the user to the location:

C:\Documents and Settings\<user name>\Application Data\ESA\MAPPS

13.2.2 MAPPS Configuration Data

There are a number of files that MAPPS needs for computing the operations. Some of these files are configuration files which can change during the mission, and therefore it is very important that these files are the same between all MAPPS users (VSOC and instrument teams).

In order to use MAPPS with the latest CONFIG_DATA files, you will need to update these files whenever VSOC notifies that an update of these files is available In VEX_SO.

Get the most recent file from LiveLink in the directory:

"VEX_SO\MAPPS\CONFIG_DATA"

and copy it to your directory:

C:\PTB\MAPPS\DATA\VEX\CONFIG_DATA.

It will be read into MAPPS automatically at start-up.

(1) eps.cfg

This file specifies which file MAPPS has to use for its calculations. It specifies:

- the experiment description files (EDFs) MAPPS should use: (VEX_SO\EDF);

- the Bit-Rate file (BRF) MAPPS should use, showing how much data can be dumped during a pass;

- Orbit definition to be visualized in the Timeline Visualization window. The orbits visualized also start from VAPO -06:00:00 (same as VPER -18:00:00) to VAPO -06:00:00 for the next orbit.

(2) events.vex.def

This file specifies the event definition for the Events in the event file. In the past we have seen that new Events were defined (for illumination constraints, for example) and updates of this file were needed. In the future no more changes on this file are foreseen.

(3) PTR_config.asc

This file is used in order to calculate the slews between the pointing blocks in the PTR file. It contains the maximum spacecraft rates and other spacecraft characteristics. It also contains the margins to be applied after the slew has been calculated.

Please note that this file was updated (the slew margins increased) after MTP003 files were completed. Running these old files using the increased slew margins results in slews for MTP001 to MTP003 breaking when we run them in MAPPS. The reason is that the original slews calculated for these MTPs now break with the new increased margins.

13.2.3 MAPPS Scenario Files

Configuration and settings information can be stored in two ways: the "RC" or settings file mentioned above, and the Scenario Files. The Scenario files contain the names of the planning files which are loaded into MAPPS, such as the PTR, ITL and EVF files. The combination of the RC file and the scenario file can help the user when they are doing multiple runs of MAPPS on multiple MTPs.

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For example, the user can load the RC file, which sets mostly the preferred visualization and operation options. The switching between MTPs can be done by loading the different Scenario files.

The Scenario files will be provided by VSOC to the instrument teams using the following formatting:

MTP001 – MTP003 – pl_mtp001___mtp003__sce_ops01a_rc

MTP003 – MTP005 - pl_mtp003___mtp005__sce_ops01a_rc

MTPXXX – MTPYYY - pl_mtpxxx___mtpyyy__sce_ops01a_rc

With XXX MTP number 1, 3, 5, etc and YYY = XXX + 2

Using this formatting you will always be able to see the overlap of the MTPs in MAPPS. In MAPPS it is possible to define 3 datasets:

Dataset01 = MTPXXX

Dataset02 = MTPXXX+1

Dataset03 = MTPXXX+2

These files should be handled in the following way:

For example: for MTP004 planning,

1. Obtain the latest VEX_SO via LiveLink.
2. Download VEX_SO and unzip.
3. Load the RC settings file as outlined previously.
4. Open MAPPS. In the main MAPPS window go to “File”/”Load Scenario”/
5. Navigate to the input directory C:\PTB\VEX_SO\MAPPS\SCENARIOS and select the file pl_mtp003___mtp005__sce_ops01a_rc, which includes MTP004.
6. When the file is loaded, select “Dataset02” (which corresponds to MTP004) and enable the checkbox.

13.3 Using VMOC files in MAPPS

13.3.1 Orbit Definition Files

The updated orbit files are available for MAPPS on LiveLink:

Venus Express/15 Tools/MAPPS/MAPPS orbits

Example orbit file names are :

Orbit definition file	orbit_def_00052.orb
Orbit data file	orbit_data_00052.asc

If you do not have the latest versions, please download these files and copy them to

C:\PTB\MAPPS\DATA\VEX\SIMULATION_DATA

Now the file can be loaded into MAPPS as discussed below.

13.3.2 Event Files

Also delivered by Flight Dynamics is the Event file. These are modified by VSOC to contain payload-related events. The current file is always copied into the file:

MISSION_event_file.evf

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so that using this file name will always give you the latest version. How to load these files into MAPPS is discussed in Section 32.4.

During the PTR generation, the MISSION_events_file should be used. Once a PTR is available, an Event file specific to the MTP will be made available which will contain LIMB_IN and LIMB_OUT events. Located in:

C:\PTB\VEX_SO\VMOC\FD

the MTP-specific Event file will be called:

EVTF_FDLVMA_DA_exe_MTPxxx___00052.EVF

Note that as Version 2.3 of this document was being generated, VSOC was transitioning from the use of a file called MTPxxx_events_file to the file discussed above. Both may be available, or only one, until the transition process is completed.

During the PTR development the contents of the MTP-specific EVTF file (or the MTPxxx event file) will be updated. VSOC will provide the updated files in the VEX_SO deliverable as they become available, along with the related PTR files.

Experiments which do not schedule observations relative to the LIMB_IN and LIMB_OUT events (for example, MAG and ASPERA) can always use the generic *MISSION_event_file.evf* for their scheduling.

13.3.3 Flight Control Team Files

The files provided by the Flight Control Team are located in

C:\PTB\VEX_SO\VMOC\FCT\

This directory contains both new and old files.

Example files names are:

FECS file	FECS_VPAVSO_D_____00005.VEX
Bit rate file	BRF___VPAVSO_D_EPS_____00003.VEX

The most recent version of the FECS file and the BRF files should be loaded automatically if the MAPPS usage procedures in Section 32 are followed.

14 Experiment Models and General Operations Files

The Planning Process consists of the generation of Pointing and Experiment Operational Timelines. Before this process can start the available Experiment Command Sequences (CSEQs) need to be known. These are converted from the ESOC Database (VMIB) directly.

In order to ease the planning process, Instrument Baseline Activity Transition (IBATs) were constructed which consist of multiple CSEQs in order to complete a specific experiment operation. Furthermore constraints and resources need to be checked by the Experiment Planning System (EPS – embedded in MAPPS software). Therefore modeling of the experiment and spacecraft constraints is required along with resource usage by the experiments (resources are power and data-rate/volume).

On an even higher level then the IBATs also general experiment observations were constructed and stored in the so-called Observations Library (OBS_LIB) for re-use throughout the mission. The OBS_LIB consists of both PTR and ITL files which have been validated. These files are used for:

(1) making the initial baseline for an MTP

For example and Case 2 from the OBS_LIB will be initially scheduled for a specific Orbit. During the planning process it can be decided that this observation will be made specific for that orbit and the General Case 2 will be replaced by the specific Case 2. This has been done already multiple times in co-ordination with the VIRTIS ream

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(2) for real re-use in the MTPs

Certain observations are required to be performed in exactly the same way during the mission. Therefore the initially scheduled observation in the initial baseline for the MTP will not be changed and will be executed (as was done in previous MTPs).

Therefore the OBS_LIB is also an initial Inputs before the Planning Process starts and serves as a database which aids the construction of the MTP timelines.

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

14.1 Experiment Description Files

Formatiert: Überschrift 3
Formatiert: Überschrift 4

14.1.1 Top-Level Experiment Description File

14.1.1.1 Description:

The instruments are modelled in the SOC Commanding Database in a series of EDF-formatted files. Some of these EDF files are extracted from the operational database (VMIB) delivered to the SOC by the MOC (experiment commands and telecommands), and some are created by the SOC as part of the long term planning (IBATs, instrument modeling).

Formatiert: Überschrift 4
Formatiert: Nummerierung und Aufzählungszeichen

14.1.1.2 EDF File Naming Convention

The EDF files for each experiment reside in a specific structure. The highest level file is called

<experiment>.edf	highest level file, containing high level operational data (FOV, modes, power and data rates for modes, etc)

where <experiment> is one of the seven experiment name strings shown in Table 1.

The other files are brought into the high level file via 'include' statements. The files and their content are:

< experiment > ibats.edf	Contains the IBATs specified by the PI Teams
< experiment > seqs.edf	Contains the telecommand sequences, or CSEQs, automatically extracted from the VMIB.
< experiment > cmds.edf	Contains the experiment commands
< experiment > model.edf	Contains detailed models of power and data rate, and instrument-specific scientific and operational constraints

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14.1.1.3 EDF File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

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14.1.1.4 EDF File Format

The Top-Level EDF file contains next to the INCLUDE statements of the other EDF files also the main part of the experiment model.

In general it will contain the

- Experiment FOVs

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The Experiment FOVs are defined here in the EDFs and these are the FOVs which are actively used by MAPPS to be shown on the Venus map. When MAPPS is used with the option "Imaging from Timeline" MAPPS will only make the FOV active when the experiment is in a certain mode.

In addition it is possible to make the FOV active only for a specific action (IBAT or CSEQS)

Example:

From virtis.edf (shows for which modes FOV should be active)

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```
   FOV: MFOV_full
   FOV_type: RECTANGULAR
   FOV_geometric_angles: 3.67 3.67
   FOV_active:     MODE M_SCIENCE \
                   MODE M_H_SCIENCE
```

From VMC.edf (shows for which IBAT the FOV should be active)

```
   FOV: FOV1
   FOV_type: CIRCULAR
   FOV_geometric_angles: 17.5
   FOV_imaging: ACTION VV_SINGLE_IMAGE
   FOV_active:     MODE PERICENTER \
           MODE MONITOR \
```

- Experiment Modes

Most experiment resources can be modeled by using defining the experiment modes.

Example:

```
      Mode:  STARLIMB1 "STARLIMB1 mode"
      Nominal_power: 17.6
      Nominal_data_rate: 26.0 [kbits/sec]
      Mode_constraints: SPI_CONS_WOL \
                        SPI_CONS_OCM
```

In the IBATs or CSEQs it will be identified when an experiment should change its mode after the completion of the Action

Example:

```
     Action: SI_StarLimb1_Low "SI_StarLimb1_Low  v04"
     Action_type: BLOCK
     Duration: 1 [seconds]
     Run_type: RELATIVE
     Update_when_ready: MODE STARLIMB1
     Run_actions: \
     00:00:00 ASIF053A  ( \                  # SI_StarLimb1_Low  v04
```

- Experiment Modules

For some experiments it is required to make a specific model of a subsystem. This is done using the Experiment Modules. These modules can be used to check for specific constraints which apply to the module (sub-system):

```
      Module: SI_SHUTTER
        Module_state: SI_CLOSED
        Module_state: SI_ROTATING
          MS_constraints: SLEW_MAN
        Module_state: SI_OPEN
          MS_constraints: SPI_CONS_ILL_FOV
```

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- Experiment Constraints

Experiment Constraints are modeled based on the Event File. The constraint will always specify if an experiment mode or action is NOT allowed during the occurrence of and event.

Example:

```
Constraint: SPI_CONS_ILL_FOV_1 "Sun Illumination in VMC FOV"
Constraint_type: TIME
Severity: FATAL
Condition: EVENT IS ISPS

Note that ISPS is the event meaning "SPICAV Illumination Start"

Constraint: SLEW_MAN "Slew Maneuver constraint"
Constraint_type: TIME
Severity: FATAL
Condition: EVENT IS SMAS

Note that SMAS is the event meaning "Slew maneuver Start"
```

Detailed information on the EDF file format is in RD04.

14.1.1.5 EDF File Validation

The SOC VMIB contents are automatically used to generate the initial EDF files. Manual updates are later made to the files for required additional information. The EDF files are validated by manual inspection – by SOC staff and by PI teams. Validation is also performed through extensive use of the files by EPS.

14.1.1.6 EDF Update Requests

During the Routine Science Planning changes to the EDFs (IBATs, models, etc.) can only be made in a very controlled manner as the EDFs are used in multiple stage of the planning process. In addition it needs to be carefully checked what kind of impact the EDFs changes (like IBAT updates) have to the EDF models. For example, adding in IBATs will probably also require that experiment modes are added. As a results these modes need to be specific at the FOV, which will be active for the specific modes. Therefore these EDF changes have a considerable workload on the SOC.
The procedure for updating EDFs is as follows:
- The PI teams sends an EDF update request to VSOC
- VSOC evaluates the impact on the EDFs and the importance of the update.
- VSOC will reply to PI team for which MTP the EDF update will be implemented.
Note that an EDF update by default only be updated before the start of a new MTP. Only in exceptional cases (when for example a new constraint is discovered) will EDFs be updated otherwise.

14.1.2 CSEQ Experiment Description File

14.1.2.1 Description

The initial process of definition of command sequences (or CSEQs), in terms of the telecommands and parameters they contain, is an activity carried out between the PIs and ESOC, with SOC taking an active interest in this process. During this process the PIs may define default values for certain CSEQ parameters which will be held in the MOC VMIB.

14.1.2.2 CSEQ Naming Convention

The CSEQ naming convention is defined in AD11. As stated there, CSEQs are identified within the MOC database by an 8-character ID "AxxYnnnZ" and these will be the names used by SOC

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in constructing PORs. The CSEQ names are derived from either flight control or contingency recovery procedures as contained in the FOP.

These fields are defined as:

Table 7: CSEQ Naming Convention

Field	Value
A	Every CSEQ starts with 'A'
Xx	2 digit instrument ID, see following Table
Y	F – Flight Control Procedure C – Contingency Recovery Procedure S - Sequence
nnn	Reference to procedure specific operations
Z	Number of sequence in a procedure (from A-Z)

The last 2 digits of the sequence long name identify the version of the sequence. E.g.:

CSEQ ID	CSEQ Long name
AVVF003A	Configure VMC for Science v04

The above example identifies the CSEQ derived from the first sequence of TCs in procedure VV-FCP-003 which is in its fourth version.

The two character abbreviations of the instrument names are shown in Section 1.2.

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14.1.2.3 CSEQ Configuration Control

The CSEQs are part of the VMIB, whose configuration control is a MOC responsibility.

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14.1.2.4 CSEQ Format

All CSEQs used in IBATs must be defined in the Venus Express Mission Information Base (VMIB) as valid instrument Flight Control Procedures (FCPs) by ESOC. The CSEQ names in the IBAT will be the CSEQ Short Name.

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14.1.2.5 CSEQ Validation

The scope of CSEQ updates and the procedure for making such updates (including new CSEQs) are formally specified in the ORCD. During mission operations SOC will play an active role in this process by raising the Document Change Request for consideration by the MOC Change Review Board. Thus PI requests for changes must be sent to SOC in the form of changes to the FOP procedure from which the affected CSEQ is generated.

The changing of a default parameter value is considered to be an update to a CSEQ definition and will follow the same procedure.

SOC will maintain synchronisation with ESOC of its copy of the instrument CSEQ in the command database. This is done by the regular ingestion of database exports from the VMIB, as specified in the change procedure, and the execution of a SOC internal procedure to detect inconsistencies between the export and the SOC database.

Where the change results in a change of CSEQ version number (as indicated by the last character of the CSEQ name), the change procedure requires the PI to advise SOC of the future

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orbit from which the updated CSEQ is to be used. The PI may then use the updated CSEQ in PMRQs that update instrument commanding from that orbit onwards. If the old CSEQ is used in any IBATs, the PI shall submit an IBAT change request to SOC to update those IBATs to use the updated CSEQ. SOC will advise when those updated IBATs can be used in generation of initial PIORs.

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14.1.3 IBAT Experiment Description File

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14.1.3.1 Description:

In order to automate the transition from TLIS to PIOR, the IBATs need to be defined. An Instrument Baseline Activity Transition (IBAT) File is a time-ordered sequence of calls to command sequences (CSEQs), which command an instrument activity or mode change. IBATS can have parameters and the parameter defaults are specified within the IBAT.

IBAT definitions are created by the PI teams, with the advice and assistance of the SOC. The IBAT must specify which TC sequences should be called in order to complete the desired instrument mode transitions or activities.

For instruments which have flown on previous missions, the PI teams may be able to create the IBAT files simply by updating the previous mission's IBAT files. In particular, the TC sequence names may need to be updated for the current mission.

For new instruments, the PI teams will need to define new IBATs.

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14.1.3.2 IBAT File Naming Convention

The IBAT file is a text file in EDF format, which contains one or more IBATs. IBAT files follow EDF file naming conventions.

The name of the IBAT files is:

<experiment>_ibat.edf

where <experiment> is one of the instrument name strings (not the abbreviation) shown in Table 1. For example,

spicav_ibat.edf

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14.1.3.3 Individual IBAT Naming Convention

The PI teams and SOC shall together assign a name to each IBAT; it shall be a lower case text string up to 18 characters in length, where the first three characters must be "`in_`" where "`in`" is the two character instrument mnemonic according to Section 1.

The IBAT File is composed of one or more IBATs. Inside the IBAT File, the name of each IBAT is shown in the IBAT block under the heading 'Action'.

The file naming convention for the IBATs (inside the IBAT file) is:

1. - for mode changes:
   <instrument abbreviation>_<current mode>_<final mode>

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2. - for high level activity, such as calibration or image sequence:

   <instrument abbreviation>_<activity> (note: no file name extension)

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Note that there is no extension or prefix on the IBAT names.

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14.1.3.4 IBAT Configuration Control

These files will be configuration controlled with unique filenames by CVS.

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14.1.3.5 IBAT Format

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The content in the individual IBATs is composed of three types of records:

1. CSEQ Name
2. Time-tags for each CSEQ as an offset from the start of the IBAT
3. the names of any parameters required by those CSEQ calls.

The CSEQ time-tags shall be expressed relative to the start time of the IBAT, so the first CSEQ will have a time tag of 00:00:00. The time between time-tags of successive command sequences in an IBAT must be greater than the sum of the delta times between the telecommands within the initial sequence. This is essential to prevent overlapping execution of command sequences.

The set of calls to command sequences shall finish with the dummy command sequence name END_IBAT. The time-tag of this dummy sequence shall indicate the latest time (relative to the start time of the IBAT) at which execution of the IBAT shall be complete. SOC shall use this time to check the relative timing of IBATs. If the command schedule requests overlapping execution of two IBATs for one instrument, the SOC software will issue a warning during preparation of the schedule for a Commanding Period and SOC staff shall revise the schedule.

Parameter names in the IBAT may be up to 16 characters in length and shall be specified in lower case. Parameters shall have values that specify the target activity. There are no special constraints on the names of these parameters.

IBATs and parameter value sets shall not contain conditional structures, i.e. once an IBAT and a parameter value set have been selected, all command sequences and parameter values in that IBAT and value set shall be copied into the draft instrument command schedule (PIOR version 1 for Commanding Period *n*).

In the input formats described below, unspecified bytes in each record are the ASCII white space character, hex 20. Tabs must **not** be used to aid formatting of the inputs.

14.1.3.6 IBAT File Example

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IBAT files can be found and viewed in the directory C:\PTB\VEX_SO\EDF, and the names are <XX>_ibat.edf, where <XX> is the name string for the particular instruments as listed in Table 1.

Below is a portion of an example IBAT file, which can be used as a template.

14.1.3.7 IBAT Validation

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The IBATs will be updated by an instrument team sending an ASCII text file containing an entire IBAT file as a complete re-submission. The SOC database checking/ingestion scripts require the input files to conform to the definitions provided. The easiest way for a instrument team to do this is to use the ASCII dump provided in VSOCWeb as the starting point for any change. Similarly, new inputs during operations must also use the same format. The SOC scripts ingest the updates in the specified format, increasing the reliability of the update process.

The ASCII file should be sent to the SOC e-mail address as an e-mail attachment. The e-mail itself must contain any relevant supplementary information, the minimum of which is:

- The name of the instrument to which the database change applies. SOC will validate that it comes from the e-mail address specified in Section 8.
- The date and time of the request
- The database entity being changed: IBAT, or other
- The nature of the change – revision of an existing entity or creation of a new entity

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SOC will acknowledge the receipt of such e-mails and will inform the PI when the database has been updated. The instrument team may then check the updated status using VSOCWeb. After

validation, which may involve concurrence from ESOC, SOC shall revise the command schedule to take account of the requested changes, if necessary.

14.2 Observation Library (OBS_LIB)

14.2.1 Description

The Observation Library (OBS Lib) will consist of Input Timeline (ITL) files that contain operational sequences, and PTR files that contain associated pointing information. When it is desired to perform an operation, the developer can invoke the needed sequences by using an Include statement in the higher-level ITL or PTR file. The files are located at VEX_SO\SAP\OBS_LIB.

The Pointing Request (PTR) files describe the pointing requests to the spacecraft. They are written in the PTR file format. The file content and format is described in RD 03.

The Input Timeline (ITL) files list the time-tagged telecommand sequences of the experiments. It can also be used down to mode level, but only for long-term planning purposes. The files are written in the ITL file format, which is described in RD04.

It is considered very important that a good description of the operations in the PTR and ITL files are provided within the file. In order to do this it is required to have the keyword ***Description*** as the first word of the comment line. Only by using this keyword will MAPPS know that the comment should be kept after processing.

For example:

Description: "Case2 with alternate +- offset for the pitch (fixed yaw)"

14.2.2 OBS Lib File Naming Convention

For the OBS LIB ITLs and PTRs, the File Name Format is:

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.EXT`

where

EX = Experiment Identifier, or PL if file is for all experiments
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = (1) MOD (Mode level ITL) or (2) PTR (Pointing Request File)
IDD = GEN (for generic) for all files in the Observation Library
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version
EXT = ITL or PTR

Examples: `AS_CASE_ALL_ASPERA___MOD_GEN01A.itl`
`PL_CASE_1___PERICENT_PTR_GEN01A.ptr`

`EX_XXXXXXXX_YYYYYYYY_ZZZ_IDNNNA.itl`

14.2.3 OBS Lib File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

The PTR file formats used by VEX are *Nadir* and *Inertial*, which are discussed in Ref 03, PTR Software Specification.

14.2.4 OBS Lib File Validation

The files will be validated through the use of the EPS software.

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15 The VEX Planning Cycles for Nominal Operations

The science operations planning and commanding concept is detailed in the VEX Science Planning and Commanding Scenario (AD 08).

VEX Mission Planning is performed in four cycles:

- Long-term
- Medium-term
- Short-term
- Very short-term

The interaction between SOC and the instrument teams is restricted to the first three phases of Mission Planning.

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16 Long-Term Planning

The long-term planning started long before the launch of the mission. It was performed by VSOC scientists together with the Science Working Team (SWT). From the mission science goals, so-called Science Themes and Sub-Themes were derived and split up into Detailed Science Objectives. These were linked to real measurements, resulting in different sets of observations.

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In addition, science cases were defined for the Venus Express mission. They are different in science goals, geometry of observations, and experiments involved. The science cases are used as building blocks of the mission Science Activity Plan (SAP). Various aspects of their implementation were studied by the industrial contractor (EADS-Astrium). All ten cases were deemed feasible with some limitations.

In addition, the VSOC operations engineers compiled a top-level overview of the mission. This is done routinely through the life of the mission, and each overview is based on the following input from the VMOC:

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- LTOF – the long-term orbit file
- LTEF – the long-term events file
- STOV - the Star Occultation Event File
- BRF – Bit-Rate File
- TMSS – The Trajectory Maneuver Slot Schedule

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- FDS SOC Constants File (FSC)

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The TMSS contains slots required by FD for orbit control (pericenter height control, phase control, etc.).

The formal delivery of these files by FD shall take place at least 6 months prior to the start of the actual operations for the planned period. With these inputs, the SOC will work with the members of the SOWG whose instruments are involved in the schedule. The SOC and SOWG members perform a trade-off between science observations and communications.

Note that for VEX, FD no longer provides the Flight Events and Communications Skeleton (FECS), which contained station schedules and windows to perform WOL and OCMs. This task has been taken over by MPS, but the FECS now contains only the station schedule. The scheduling of the windows for reaction wheel offloading (WOL) is left to the SOC, which has to follow the rules stated in the SOIA App. D. The scheduling of windows for OCMs is done by FD and specified in the TMSS.

The FDS SOC Constants File contains constants to be used by the SOC at different phases of the mission planning to compute attitude slew durations, define custom attitude profiles, etc. The FDS SOC Constants File will be delivered when new constants are required, or existing constants must be updated. It is expected that an update of the Constants File will only exceptionally be required. See AD04 for more details.

Based on the provided information, a top-level overview is provided in the overview poster AD13. It shows where the different Occultation Seasons (Earth and Sun) take place and how the data-rate changes over the mission. Based on this it can be determined where specific observations should be performed.

The above information was also the basis for the Science Activity Plan (SAP), which consists of a timeline listing which Science Cases are flown for the specific orbits.

The MAPPS tool also allows viewing of the Long Term products, to visualise the timing of occultations, ground stations and the Venus ground track.

16.1 Science Themes

The science operations planning is structured according to Figure 1. There are two sides to the planning: The science side with their science goals, and the operations side with the constraints of the spacecraft and the environment. Both of these are grouped and detailed, until one arrives at 'observations'. Observations are building blocks which perform certain measurements contributing a detailed science goal. Of course it is possible that more than one observation is needed to completely fulfil a science goal, or a repeat of observations. Also, it is possible that observations contribute to more than one science goal.

From the operational side, there will be operational constraints coming from the spacecraft or other experiments. Also, the trajectory and other environmental conditions like spacecraft illumination will influence the timing of operations. These will influence the "mission scenarios" or "orbit types" that contain of a group of observations.

This abstract structure will be filled up with real science objectives, observations, and scenarios in a three-step planning process consisting of long-term planning, medium-term planning, and short-term planning. A more detailed description follows in the later Sections.

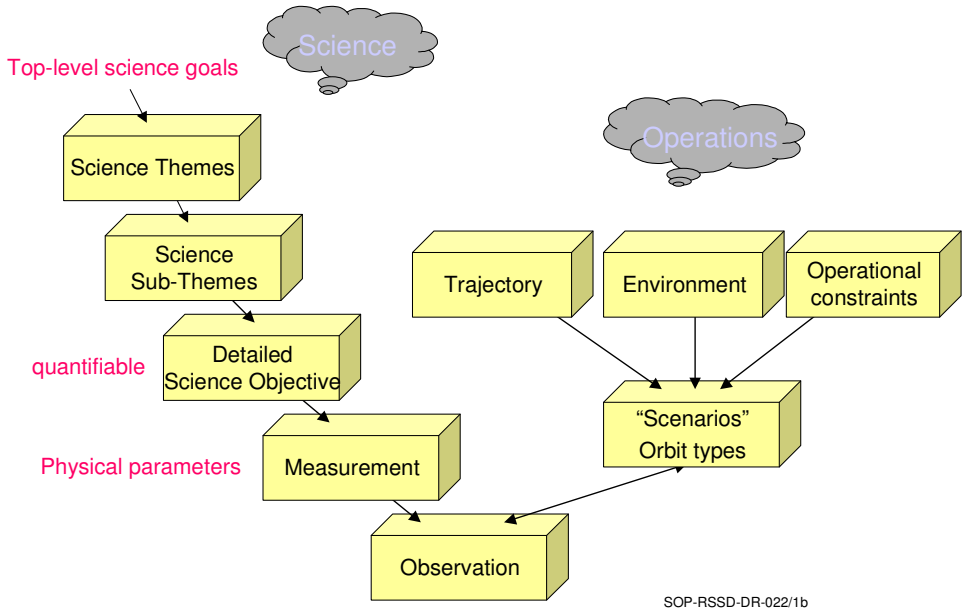

Figure 1: General concept of science planning using science themes.

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Gelöscht: Nominal operations require that the production of command sequences be done months in advance of execution, be accurate and be done quickly. To meet these goals, the nominal mission command generation will be as simple as possible, and the process as fully automated as possible.¶
To meet the goal of automating the nominal process, each instrument is modeled in a series of files. The modeling is created in the SOC Commanding Database as a series of ASCII files in the Experiment Data File (EDF) format. This modeling pushes a lot of work to the early planning phases of the mission, but makes the automation of the nominal mission possible. The models define the individual 'states' of each instrument, and the resources used in that state. ¶
Once the instrument states are defined via the EDF files, the state transitions must be modeled. This is done in the Instrument Baseline Activity Transitions (IBAT) files. These files, created for each instrument and in ITL format, are used to specify in advance the telecommands (or telecommand sequences) used to move the instrument from one state to another. The IBAT files are explained in Section 13.7.¶
The preparation of these IBAT files accurately models the instrument allowable states, and the methods of changing states. During nominal operations, the instruments can be commanded by creating the TLIS file. This file will list times relative to key events, the instrument mode change desired at that time, and the command sequences to accomplish the mode cl
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16.2 Science Activity Plan (SAP)

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The Science Activity Plan (AD 07), drawn up by the SOWG and formally approved by the SWT, will be the mechanism for harmonisation of high-level instrument team science requests. The SAP will take into account predicted spacecraft operations and available spacecraft resources at particular points in the mission. These will be consolidated into a timeline for the complete mission with science cases per orbit. The SAP baseline has been scheduled with 2 science cases per orbit, but if other cases can be added later on in the planning process this is not excluded. In practice we have seen that during Medium Term planning the number of science cases per orbit is raised to 4. The SAP was previously structured such that the operations were planned per mission phase, but will now be planned per MTP.

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Gelöscht: and likely instrument operations, or 'science cases'.

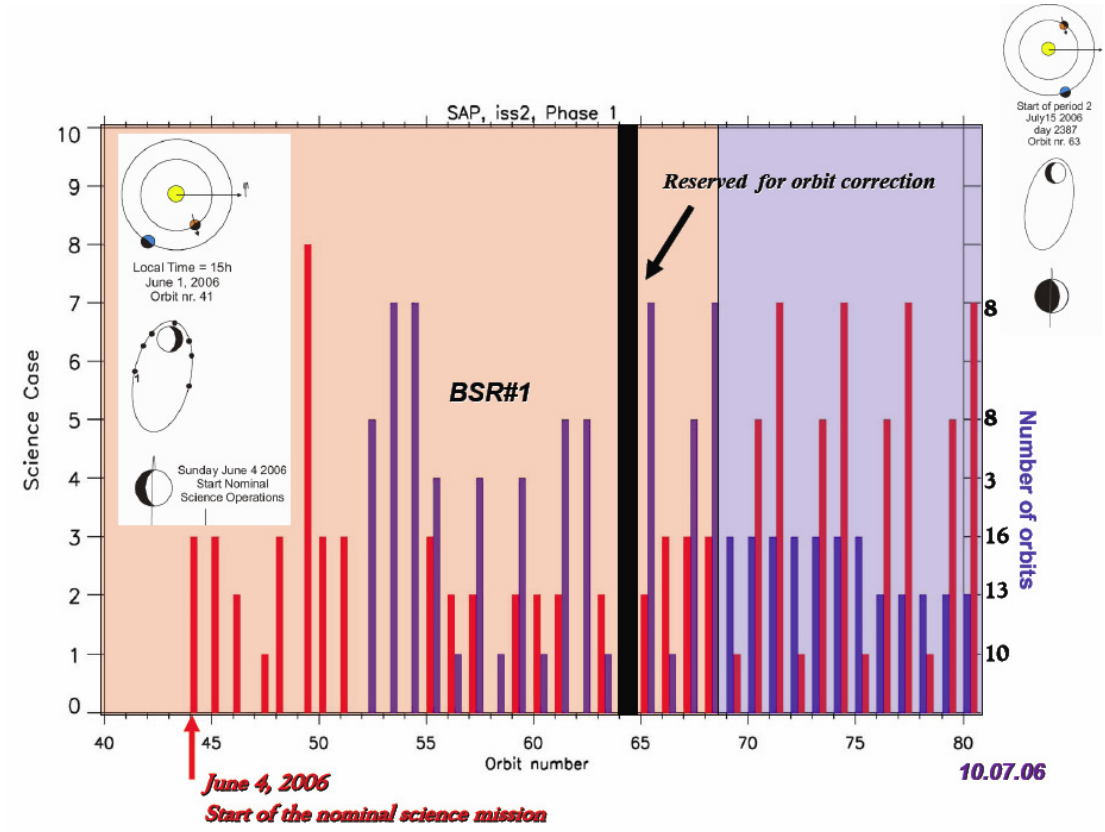

Figure 2: Example of Science Cases Per Orbit for Phase 1

The SAP can be adjusted based on experience acquired during the mission, such as new constraints or new science objectives (based on science results from previous observations).

The SAP will always serve as the main input for the Medium Term Planning (MTP) process. During the MTP process the SAP will be used as a baseline. However, required changes can be made by the instrument teams during the MTP telecon meetings between all instrument teams.

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17 Medium Term Planning Process

Based on the SAP, each month the Medium Term Plan (MTP time span is 28 days) will be broken down and planned in more detail. The SOWG, co-ordinated by and technically supported from SOC, will resolve spacecraft resource conflicts to prepare resource-harmonized 28 day segments of the MTP. This will be done on schedule for SOC to supply pointing requests (PTR files) and experiment operations requests (ITL files) to MOC for analysis.

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17.1 MTP generation process, telecons and documents

The MTP generation process has a duration of about 4 weeks and consists of a number of telecons with all the instrument teams (one every week). The MTP is documented in the Master Science Plan (MSP) documents with specific updates which are closely related to the MTP development during the telecons. In addition, planning files (PTR and ITL files) are continuously distributed from VSOC to the instrument teams, while instrument teams are providing their inputs to VSOC.

Below you will find a description of the telecons, the documents sent and the status of the planning files, related to the MTP development schedule example in Figure 16-1. The most recent development schedule is available on LiveLink.

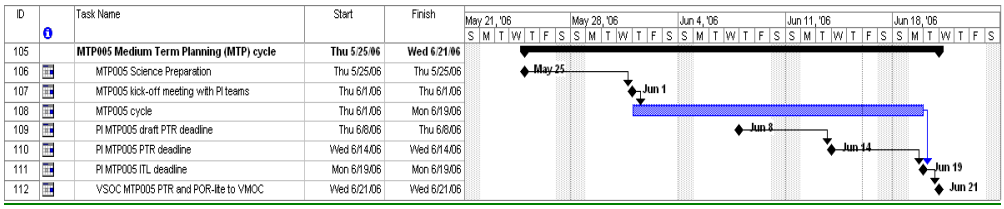

Figure 16-1 – Typical MTP development schedule

Formatiert: Zentriert

	Telecon	MSP version	PTR status	ITL status
1	Science Preparation	1	Baseline	--
2	Kick-off	2	Draft	Baseline
3	Consolidated PTR	2	Final	Baseline
4	ITL Evaluation	3	Final	Draft
5	Final ITL	4	Final	Final
6	VMOC validation	5	Final	Final
7	Post observation	6	Executed	Executed

Table 16-1 – MTP development telecon overview

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Formatiert: Überschrift 3

17.1.1 Science Preparation Meeting

During the Science Preparation Telecon, discussions will be held about what science themes will be covered in the MTP. This is done in order to assure that the science observations are well coordinated and that experiments are working together in order to complete the mission science goals.

Science Preparation Meeting Agenda

1. Science Overview to confirm the science objectives and science themes of the MTP
2. Tracking of the Science Themes

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3. Agreement on Science Cases per Orbit
4. Agree on the data-volume allocation
5. Discuss and confirm the pointings per orbit
6. Give overview of baseline PTR
7. Identify open points on PTR development, provide guidelines for draft PTR generation
8. Review of MTP Schedule and Actions

MSP version

Before the Science Preparation telecon, MSP Issue 1 will be available. This version will contain all known operational information.

After the Science Preparation telecon, MSP Issue 2 will be written, which will contain the science theme coverage for the MTP.

Planning File Distribution

A draft PTR file will be distributed at this stage.

MAPPS usage

At this stage instrument teams can use MAPPS to understand the conditions for doing science at Venus. MAPPS will show when Occultations occur and when the spacecraft will be looking at night or day side of the planet. More detailed information can be found in MAPPS when using the MAPPS overlays, which will provide multiple parameters such as altitude, Local Time, etc.

Instrument teams are also allowed to start checking the PTR for their observations at this stage if this will help them for the Science Preparation meeting and/or as a justification for the importance/uniqueness of the science observations

17.1.2 MTP Kick-off Meeting

During the MTP kick-off meeting VSOC will go over the baseline PTR file and discuss with the instrument teams if any changes are needed. In general, some of the general files (from OBS_LIB) will be requested to be fine-tuned by the instrument teams. Also there will be some observations (like occultations) which will always need specific files for the specific occultation conditions.

The VeRA team will also be requested to deliver their so-called CUSTOM attitude file for their specific pointings for Bi-Static Radar and Earth Occultation observations.

All the PTR files that require updates will be identified, and the instrument teams responsible for the PTR change will be requested to deliver the PTR updates before the next Tuesday. The files delivered on Tuesday should be as complete and Final as possible. The consolidated PTR created for the next meeting should be Final if at all possible.

MTP Kick-Off Meeting Agenda

1. Review open points on planning issues (e.g. new constraints, MAPPS updates, etc.)
2. Review the consolidated draft PTR
3. Identify open points on PTR development; determine guidelines for final PTR generation; freeze PTR where possible, to allow ITL files to be finalized
4. Review of MTP Schedule and Actions

MSP version

MSP Issue 2 will be available before the Kick-off meeting.

Planning File Distribution

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The VEX_SO directory will be made available on LiveLink and will contain a LTP PTR file and an LTP ITL file, which will use general planning files from the OBS_LIB directory.

At this stage the MISSION_event_file.evf will be used for starting the PTR generation

The MAPPS timeline PDF will be distributed in order to visualize the operations. Note that it is recommended to use MAPPS directly by loading the planning files.

MAPPS usage

Load the Top-Level LTP PTR files and compute with MAPPS

Make sure you have the latest VEX_SO files.

VEX_SO\SAP\LTP\MTPXXX

PTR File: PL_MTPxxx_MTPxxx_PTR_OPS01A.ptr

The ITL file can be loaded as well, but at this stage the ITL has only been provided as a baseline and it is likely that the operations from the ITL are not synchronized with the pointing from the PTR.

ITL File: PL_MTPxxx_MTPxxx_ITL_OPS01A.itl

Note that it is also possible to load these files automatically by opening the MAPPS scenario file for the relevant MTP. The MAPPS scenario file is located in VEX_SO\MAPPS\SCENARIOS. Open the scenario which covers the MTP you are looking at. The scenario file will cover 3 MTPs, make sure you are looking at the correct one by selecting the correct data-set in MAPPS.

By computing these files in MAPPS the Timeline Visualisation window will give an overview of the operations. This should be the same as the MAPPS timeline PDF which has also been provided by VSOC.

17.1.3 Consolidated PTR Meeting

During the MTP Draft PTR meeting, VSOC will go over the draft PTR and discuss with the PI teams if there are any open issues. If there are, agreements will be made to solve these and small updates to the PTR will need to be provided before next Tuesday again. At this stage certain parts of the PTR file can already be considered as frozen and PI teams can already start with the ITL preparation for these frozen PTR parts. The draft ITL files generated for the next meeting should be as complete and final as possible, to help ensure timely delivery of the final files to the VMOC as required.

The VeRA team will provide VSOC with a User Custom Attitude File (UCAV) which contains the description of user pointing profiles. Reference to such a file is provided by VeRA in the PTR by means of the CUSTOM pointing-type blocks. The CUSTOM pointing requests of one PTR are specified in only one UCAV (different requests shall be gathered in a unique file). VSOC will request VeRA to provide the PTR files for each orbit in which VeRA is operated.

It is currently foreseen to implement VeRA special pointing by this mechanism for Science Case #4 (Bi-Static Radar) and #8 (Earth Occultations). FDT will check the UCAV along with the PTR. See AD 04 for more details on the UCAF.

Consolidated PTR Meeting Agenda

1. Consolidate Final PTR file (including thermal checks)
2. Discuss possible unfrozen parts of PTR
3. Determine teams responsible for providing final pointing inputs
4. Verify what draft ITLs (for frozen PTRs) can be finalized
5. Review of MTP Schedule and Actions

MSP version

MSP Issue 2

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Planning File Distribution

VEX SO will be updated before the meeting and distributed via LiveLink. This version will also include the VeRA PTRs and UCAV.

MAPPS usage

Reload the Top-Level LTP PTR and LTP ITL for the new files and look at the updates in Pointing.

17.1.4 ITL Evaluation Meeting

After the last updates of the PTR have been received VSOC, will process the PTR file and make a thermal check on the file. In case thermal violations are found they need to be solved using PTR updates. After the thermal check has been passed, the Event File will be generated from the PTR file. This Event File will contain the so-called LIMB events, which are important for upcoming ITLs which are scheduled relative to the LIMB. In addition, the Event Files will contain the illumination events for the experiments, which will flag conflicts in case illumination constraints are violated.

Now all PI teams should focus their attention on the ITL development. For this meeting, the final ITL files should be generated, if at all possible. In the MSP the data-volume allocation for the experiments for the MTP is provided. The instrument teams should respect this data-volume allocation in the generation of the ITL files. They can check the data-volumes using MAPPS.

Some PI teams (SPICAV, VeRA, VIRTIS and VMC) provide the ITL inputs using the LTP file format.

Other PI teams (MAG, ASPERA) generate the ITL files based on the MTP files (one file per experiment per MTP). VeRA makes an additional verification on the MTP ITL files which were generated from their LTP ITL inputs.

ITL Evaluation Meeting Agenda

1. Give overview of draft ITL files
2. Appoint responsible PI teams for providing final ITL Inputs
3. Remind teams of specific PIOR deadlines
4. Review of MTP Schedule and Actions

MSP version

MSP Issue 3 will be available before the Final PTR meeting and will describe the final PTR.

Planning File Distribution

VEX SO will be updated before the meeting and distributed via LiveLink. It will contain the latest PTR file and the generated MTP event file(!).

In addition, the MTP ITLs files are submitted to ASPERA and MAG for updates and to VeRA for verification.

MAPPS usage

First of all, load the Event File in MAPPS which has been generated from the Final PTR file. This event file is called: in VEX_SO\VMOC\FD\MTPXXX_event_file.evf, or EVTF_FDLVMA_DA_exe_MTPxxx___00052.EVF. This file contains the LIMB and illumination events required to produce the final ITL file.

You can also load the Event File by loading again the MAPPS SCENARIO file, which will be updated by the SOC in order to include the event file.

Reload the Top-Level LTP PTR and LTP ITL for the new files and look at the updates in Pointing. At this stage it is also possible that already some ITL files have been produced, which

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have been properly synchronized with the PTR parts that are already frozen. These can also be visualized in MAPPS

17.1.5 MTP Final ITL and PTR

No final meeting is required after all the inputs have been received. VSOC will receive ITL feedback using the LTP ITLs from SPICAV, VIRTIS and VMC and the MTP ITLs (over official Interface) from MAG, ASPERA and VeRA. VSOC will verify the ITLs from the instrument teams and process them for submission to VMOC. VSOC will process the ITLs into the so-called POR-Lite (one file per experiment per orbit).

VSOC will submit the PTR and the POR-lite files to VMOC at the same time. After VMOC receives the files, VMOC FD will first process the PTR file and generate the FD planning inputs. Then, together with the FD planning inputs the POR-lite will be checked by VMOC FCT.

During both these steps iteration with VSOC are possible. VSOC will co-ordinate iterations again with the instrument teams in order to get a harmonized set of planning files.

At the end of this activity the on-board resource usage is fixed. The on-board resources which are relevant during this analysis are: Pointing, Power, OBDH Data Rate, Downlink Data Volume and TC Buffer Size (if appropriate).

MSP version

MSP Issue 4 will be written when the PTR and ITL are completed from VSOC and are submitted to VMOC.

MSP Issue 5 will be written when iteration on PTR and ITL are necessary with VMOC and PI teams. For all first MTPs (MTP001 to MTP004) these kinds of iterations have been necessary.

Planning File Distribution

VEX_SO will be updated with the latest PTR and ITLs and made available on LiveLink.

When iterations are required during the VMOC verification, VSOC will notify the instrument teams and supply them with new version of VEX_SO.

MAPPS usage

Reload the Top-Level PTR and ITL for the new files and look at the updates in Operations, which should now be perfectly synchronized with the Pointing. In addition you should look at the MAPPS Summary, which provides an overview of the data generation and SSMM usage for the MTP. It needs to be verified that there is no SSMM overflow during the MTP and that at the last orbit the SSMM is dumped empty. This is required in order to make a clear hand-over from one MTP to the other.

Note that after VMOC has confirmed the operations, it is recommended to load the MTP files for the MTP in MAPPS from this moment onwards. The reason is that the LTP PTR and ITL files use INCLUDE files from the OS_LIB, and the files in the Observation Library can change after the files for an MTP have been processed. The processed MTP file are self-contained and are therefore not sensitive to changes in the OBS_LIB.

To load the MTP PTR and ITL file select the following files in MAPPS:

VEX_SO\SAP\MTP\MTPXXX\

PTR File: PL_MTPXXX___nnnn_mmmmPTR_OPS01A.ptr

ITL File: PL_MTPXXX___nnnn_mmmmMOD_OPS01A.itl

(with nnnn first orbit of the MTP and mmmm the last orbit of the MTP)

Again you can also re-load the MAPPS SCENARIO file which has been updated by VSOC to INCLUDE the MTP files.

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Formatiert: Schriftart: Nicht Kursiv
Formatiert: Englisch (Großbritannien)

Gelöscht: 0
Gelöscht: 15
Gelöscht: May
Formatiert: Überschrift 3

17.1.6 MTP Post Observation

MSP version

MSP version 6 will be produced after the operations have been executed on the spacecraft. A summary of unexpected events will be provided. In addition the acquired data-volume will be documented and compared to the estimated data-volume. There should not be much difference between these values. Significant differences may indicate a need to update the planning models in order to get the estimations closer to reality.

MAPPS usage

As mentioned in previous chapters, the best way to look at the performed observations during the MTP is to look at the MTP PTR and ITL files. It is recommended to do this in order to keep track of which science observations have already been done. This is important to evaluate what still needs to be done for future observations.

To load the MTP PTR and ITL file select the following files in MAPPS:

VEX_SO\SAP\MTP\MTPXXX\

PTR File: PL_MTPXXX___nnnn_mmmmPTR_OPS01A.ptr

ITL File: PL_MTPXXX___nnnn_mmmmMOD_OPS01A.itl

(with nnnn first orbit of the MTP and mmmm the last orbit of the MTP)

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17.2 MTP planning process using both LTP and MTP planning files!

Because there has been confusion within the teams concerning the planning files located in the LTP and MTP directories, which are BOTH used during the MTP planning process. Please find below a description of how the files are defined and how they should be used.

Definitions:

MTPXXX LTP PTR and LTP ITLs are the planning files which contain INCLUDE files for each orbit. These INCLUDE files are in the Observation Library (OBS_LIB) or are specific for the orbit, in which case they are in the VEX_SO\SAP\LTP/MTPXXX directory. Please note that for some experiments (SPICAV, VIRTIS and VMC) these LTP files are now used for the Medium Term Planning (MTP) process. These files are sent by email.

These LTP PTR and ITL files are processed automatically by the VSOC EPS software to produce the MTP PTR and ITL files, which are located in the VEX_SO\SAP\MTP/MTPXXX directory. These files do not contain INCLUDE files anymore. For the PTRs, all PTR blocks specified are in one file; and for the ITL files all the experiment IBATS are now in one file. These files are sent over the official interface.

MAG, ASPERA and VeRA use these MTP-directory files for their planning with VSOC. The files in the VEX_SO\SAP\MTP directory offer on opportunity for a final check for the other experiments as well, but this check is not mandatory and can be ignored if the instrument teams wish.

In the following section more detailed information is provided on the filenames and handling of the LTP and MTP files.

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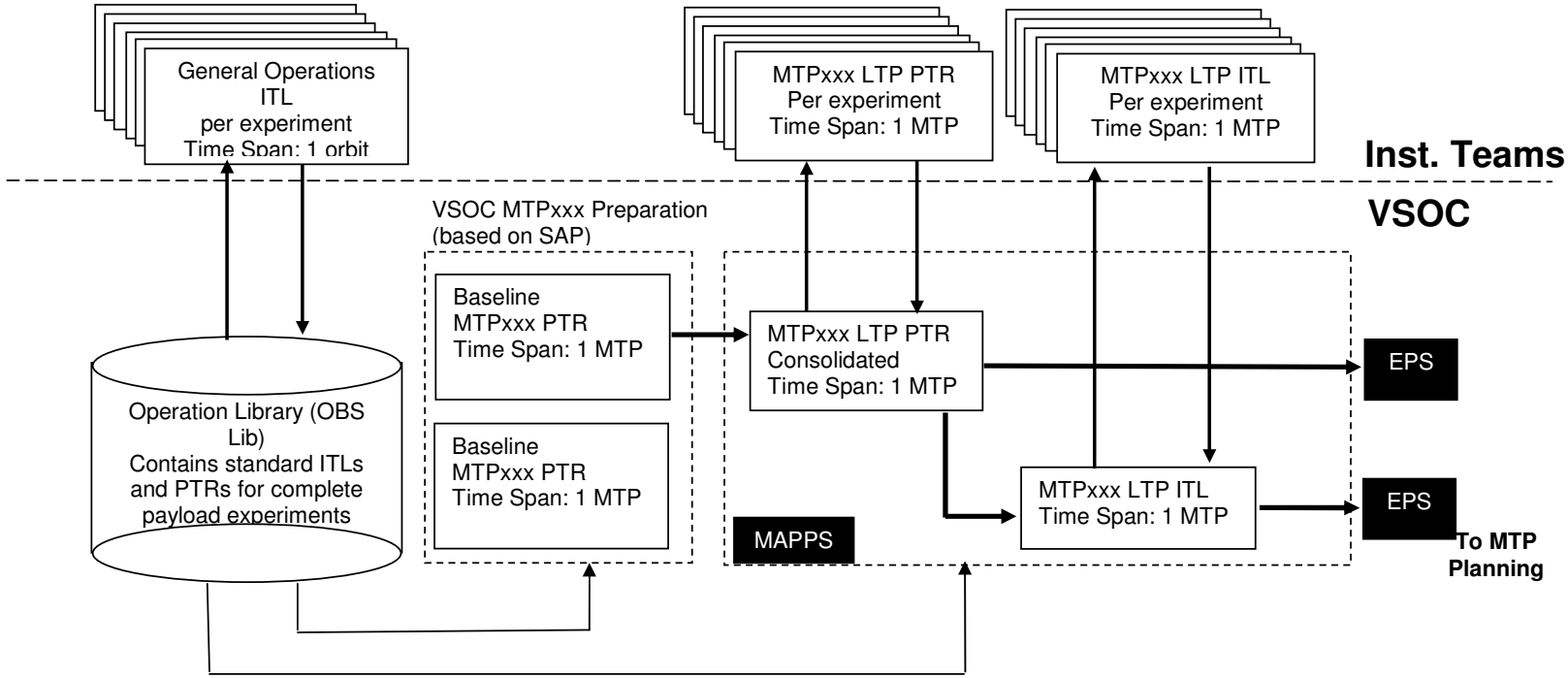
Figure 3: SOC LTP Planning



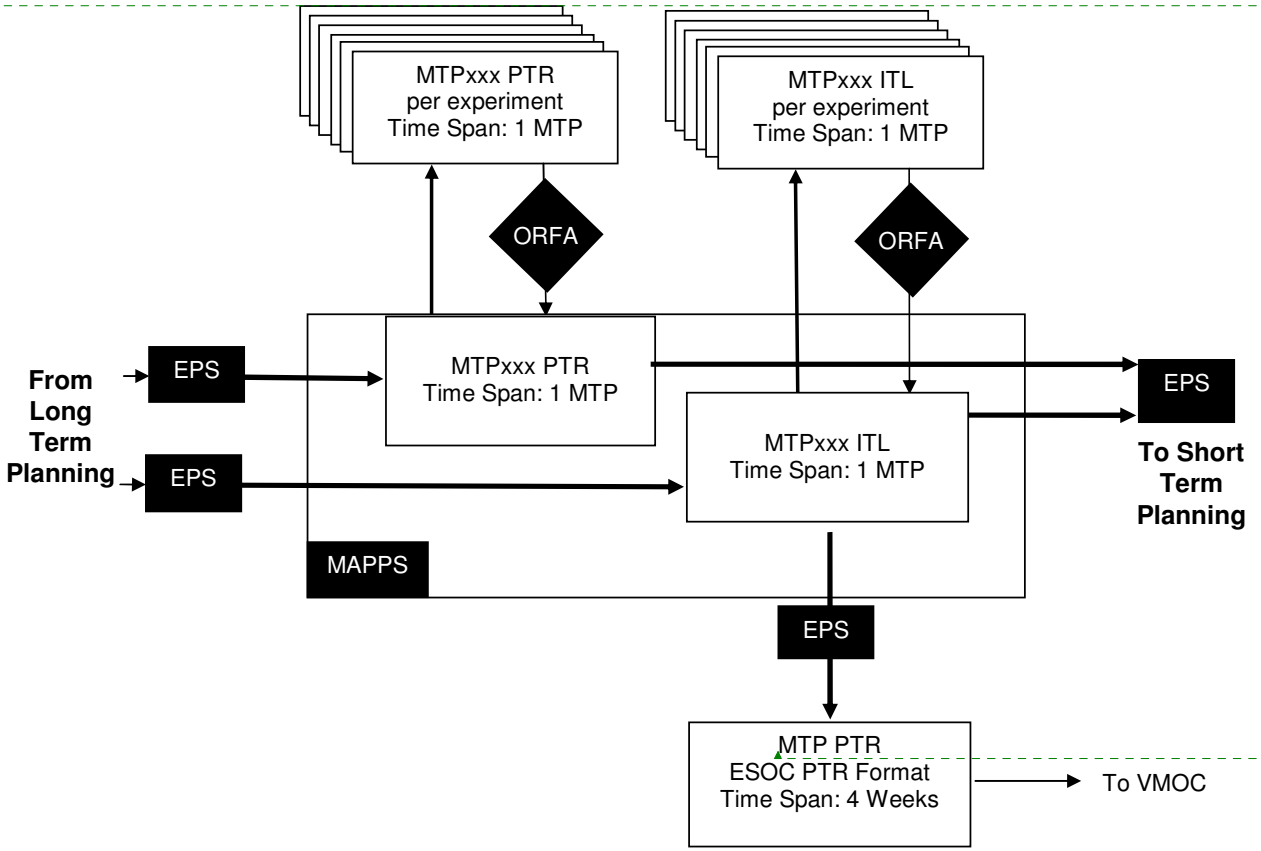


Figure 4: SOC MTP Planning

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Gelöscht: <#>OBS LIB ITLs and PTRs¶
<#>Description ¶
The Observation Library (OBS Lib) will consist of Input Timeline (ITL) files that contain operational sequences, and PTR files that contain associated pointing information. When it is desired to perform an operation, the developer can invoke the needed sequences by using an Include statement in the higher-level ITL or PTR file. The files are located at VEX_SO\SAP\OBS_LIB.¶
The Pointing Request (PTR) files describe the pointing requests to the spacecraft. They are written in the PTR file format. The file content and format is described in RD 03.¶
The Input Timeline (ITL) files list the time-tagged telecommand sequences of the experiments. It can also be used down to mode level, but only for long-term planning purposes. The files are written in the ITL file format, which is described in RD04.¶
<#>OBS Lib File Namin ... [24]

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17.3 MISSION event file

17.3.1 Description

Before PTR and ITL development can start it is important that the Events to which the PTR and ITL will be scheduled are known. The following Events are of importance for the initial phases of the planning:

- VPER (Venus Pericenter) – Most initial PTRs and ITLs are scheduled relative to the Venus Pericenter.

- PENS and PENE (Penumbra Start and Penumbra End) – Solar Occultation Events which are available in the Long Term Planning Event file are used for PTR and ITL operations for the Solar Occultation observations.

In addition it is important to have the information on the Ground Station booking available, which is delivered to VSOC in the FECS.

The FECS contains

- Ground Stations Start and End events for Cebreros (for dumping data) and New Norcia and DSN (for the VeRA observations).

- Events for the Start and End of the SSMM dump.

The FD Event files are located in the directory VEX_SO\SAP\VMOC\FD

The FECS files are located in the directory VEX_SO\SAP\VMOC\FCT

17.3.2 MISSION event file for MTP

VSOC includes the latest FD event file and FCT FECS file in one single event file:

Format: `MISSION_event_file.evf`

FD Event File Example: EVTF_FDLVMA_DA_____S_00009.VEX
FCT FECS File Example: FECS_VPAVSO_D_061521335_000_00009.VEX

More information on the FD Event File can be found in AD 03.
More information on the FCT FECS can be found in AD 03.
See also Section 12.3

17.3.3 MISSION Event File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

17.3.4 MISSION Event File Validation

The files will be validated through the use of the EPS software.

17.4 LTP ITL Files

17.4.1 Description

These files are located in the directory VEX_SO\SAP\LTP\MTPxxx where xxx is the three digit MTP number.

It is very important that a good description of the operations in the ITL files are provided within the file comments. In order to do this it is required to have the keyword ***Description*** as the first word of the comment line. Only by using this keyword will MAPPS know that the comment should be kept after processing and placed into subsequent files.

For example:

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Formatiert: Nummerierung und Aufzählungszeichen

Gelöscht: <#>Medium Term Planning¶
Once the Level B SAP is written for the relevant mission phases, each month (4 weeks) will be broken down and planned in more detail. The SOWG, with policy co-ordinated by and technical support from SOC, will resolve spacecraft resource conflicts to prepare resource-harmonized 4-week segments of the MTP on schedule for SOC to supply pointing requests to MOC analysis of the proposed slews. The MTP segments that have been resource-harmonized by SOWG, and successfully passed the slew analysis of the MOC Flight Dynamics Team, will be placed on VSOCweb so PI teams can view the timeline of activities that will be used to create the command schedule for the agreed period. In extraordinary cases SOC may request MTP updates, via the Project Scientist, to clarify problems identified during preparation of the command schedule. The end of a Medium Term Planning exercise shall occur 4 weeks prior to t... [25]

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Description: "Case2 with alternate +- offset for the pitch (fixed yaw)"

17.4.2 LTP ITL Files For The Complete Payload

For an LTP file, there is a top-level file which is used for all the experiments. The content primarily consists of 'include' statements which read in the ITL content for the individual experiments, either generic files from the OBS Lib or orbit-specific files.

Format: EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.itl

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
YYYYYYYY = MTPxxx (where xxx is the MTP number with leading zeroes)
ZZZ = ITL
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples: `PL_MTP003____MTP003___ITL_OPS01A.itl`

17.4.3 For Individual Experiments:

The top-level file for an LTP consists primarily of 'include' statements which read in the ITL content for the individual experiments. The files for the individual experiments are named as shown in this section.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_NNNNNA.itl`

where

EX = the two letter abbreviation for the experiment (see Section 1.2)
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = MOD or SEQ (for VeRa ITL files only)
NNNNN = the identifier of the orbit for which this file is written, in the form 'OR' for orbit, followed by a three digit orbit number with leading zeroes.
A = the minor modification identifier of the high-level version

Examples: `TV_CASE_8___TV_OCC___SEQ_OR089A.itl`
`VR_CASE_7___LIMB_____MOD_OR073A.itl`

17.4.4 LTP ITL File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

17.4.5 LTP ITL File Validation

The files will be validated through the use of the EPS software.

17.5 LTP PTR Files

17.5.1 Description

These files are located in the directory VEX_SO\SAP\LTP\MTPxxx where xxx is the three digit MTP number.

It is very important that a good description of the operations in the PTR files are provided within the file comments. To do this, have the keyword ***Description*** as the first word of the comment line. Only by using this keyword will MAPPS know that the comment should be kept after processing and placed in subsequent files.

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Formatiert: Überschrift 3

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

For example:

Description: "Case2 with alternate +- offset for the pitch (fixed yaw)"

Formatiert: Nummerierung und Aufzählungszeichen

17.5.2 LTP PTR Files For Complete Payload

For an LTP file, there is a top-level file which is used for all the experiments. The content primarily consists of 'include' statements which read in the PTR content for the individual experiments, either generic files from the OBS Lib or orbit-specific files.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.ptr`

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
YYYYYYYY = MTPxxx (where xxx is the MTP number with leading zeroes)
ZZZ = PTR
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples: `PL_MTP003____MTP003___PTR_OPS01A.ptr`
`PL_MTP004____MTP004___PTR_OPS01A.ptr`

Formatiert: Nummerierung und Aufzählungszeichen

17.5.3 LTP PTR Files For Individual Experiments or Special Orbits

The top-level file for an LTP consists primarily of 'include' statements which read in the PTR content for the individual experiments. The files for the individual experiments are named as shown in this section.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_NNNNNA.ptr`

where

EX = the two letter abbreviation for the experiment (see Section 1.2) if only one is involved (such as TV), or PL if the special pointing is for multiple experiments on a particular orbit.
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = PTR
NNNNN = the identifier of the orbit for which this file is written, in the form 'OR' for orbit, followed by a three digit orbit number with leading zeroes.
A = the minor modification identifier of the high-level version

Examples: `TV_CASE_8___TV_OCC___PTR_OR087A.ptr`
`PL_CASE_5___HR1879___PTR_OR076A.ptr`

Formatiert: Nummerierung und Aufzählungszeichen

17.5.4 LTP PTR File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

Formatiert: Nummerierung und Aufzählungszeichen

17.5.5 LTP PTR File Validation

The files will be validated through the use of the EPS software.

Formatiert: Nummerierung und Aufzählungszeichen

17.6 MTP ITL And PTR Files

17.6.1 Description

An LTP ITL file will be created for each midterm planning period, in the directory VEX_SO\SAP\LTP\MTPxxx. Each of these LTP ITL files will then be expanded into an MTP ITL

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Gelöscht: 15
Gelöscht: May

file, in which the file content can be expanded by replacing the LTP-level *Include* statements with the include file contents. This leaves the file containing the IBAT calls, in the directory VEX_SO\SAP\MTP\MTPxxx. Each MTP ITL file will have an associated MTP Pointing Timeline Request (PTR) file. The conversion of the LTP ITL into the MTP ITL is the start of the MTP planning process.

During the MTP Cycle, the SOC produces the Pointing Timeline Requests, which are sent to the Flight Dynamics Team (FDT) at the MOC and are available for download from VSOCWeb. The PTR contains the definition of the required pointing strategies, covers a 4 week period and is delivered at least 4 weeks prior to the start of actual operations. The FDT checks the PTR, and upon successful verification of the file the FDT generates the Flight Dynamics Timeline (FTL). The FTL has the same contents as the PTR, but the relative times for pointing phases are changed to absolute times. FDT checks the feasibility of the PTR from the point of view of the spacecraft dynamics. If the pointing requests are feasible, FDT sends the FTL back to the SOC for information purposes.

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2 MTP ITL and PTR Files

The start of the MTP planning process occurs when the LTP ITL files are converted into an MTP ITL. Each MTP directory contains a top-level ITL file which is used for all the experiments. The content primarily consists of 'include' statements which read in the ITL content for the individual experiments.

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2.1 MTP ITL Files For Complete Payload

Format: `EX_XXXXXXXX_WWWW_WWWWZZZ_IDNNNA.itl`

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
WWWW_WWWW = <start_orbit>_<end_orbit>
ZZZ = MOD
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples:
```
PL_MTP001___0051_0078MOD_OPS01A.itl
PL_MTP002___0044_0071MOD_OPS01A.itl
```

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2.2 MTP ITL Files For Individual Experiments

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_NNNNNN.itl`

where

EX = the two letter abbreviation for the experiment (see Section 1.2)
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
WWWW_WWWW = <start_orbit>_<end_orbit>
ZZZ = MOD
NNNNNN = the identifier of the updates made by VSOC and by the PI teams.
VSx - update made by VSOC
PIy - update made by PI team

Further details on this version numbering can be found below in Section 0.

Examples:
```
TV_MTP002___0044_0071MOD_VSXPIY.itl
AS_MTP001___0051_0078MOD_VS0PI1.itl
```

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Gelöscht: May

When an iteration requires an update of the files, the version number will be changed to record the new version and also indicate the source of the change. For example, if an experiment team would like to request an update to the ITL, this can be done by incrementing the PI(y) in the title to PI(y+1):

`VR_MTP001___0050_0078MOD_VS0PI0.itl` (sent out by VSOC)

becomes

`VR_MTP001___0050_0078MOD_VS0PI1.itl` (returned by VR team)

These files are located in the directory VEX_SO\SAP\MTP\MTPxxx where xxx is the three digit MTP number.

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2.3 MTP PTR Files For Complete Payload

For an MTP, there is a top-level PTR file which is used for all the experiments. The content primarily consists of 'include' statements which read in the PTR content for the individual experiments, either generic files from the OBS Lib or orbit-specific files.

Format: `EX_XXXXXXXX_WWWW_WWWWZZZ_IDNNNA.PTR`

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
WWWW_WWWW = <start_orbit>_<end_orbit>
ZZZ = PTR
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples: `PL_MTP002___0044_0071PTR_OPS02A.ptr`
`PL_MTP003___0072_0099PTR_OPS01A.ptr`

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2.4 MTP PTR Files For Individual Experiments or Special Orbits

For MTPs, there is only a single, top-level PTR file. There are no MTP PTR files for individual experiments or special orbits.

Formatiert: Nummerierung und Aufzählungszeichen

17.6.2.5 Instrument Team Updates of MTP ITL Files

For every instrument team update or review of an ITL or PTR file, the name must be changed to reflect the new version. It is VERY IMPORTANT that the file name is always updated to the latest version number, or else the correct operations will NOT be verified.

When instrument teams wish to confirm the contents of a file as being OK, or wish to modify or update a file, they do the following:

- Confirm: if the file sent by VSOC to the instrument team is accepted in its current format, the instrument team only needs to send an e-mail to the VSOC e-mail address, stating in the message Subject the name of the file, and adding after it "is verified". A copy of the file does not need to be renamed and returned; the e-mail verification is sufficient. And example message Subject line would be:

  Subject: VR_MTP002___0044_0071MOD_VS2PI0.itl is verified and OK

- Modify: return the file with the updated values, with the file name updated to create the PMRQ. In the file name, the "PI(y)" in the name is changed to "PI(y+1)." For example, the instrument team would change the file named
  AS_MTP003___0072_0099MOD_VS0PI0.itl to
  AS_MTP003___0072_0099MOD_VS0PI1.itl.

17.6.3 MTP ITL And PTR File Configuration Control

When VSOC processes the MTP files, the file VSXPIY is always kept as the operational file that is referred to in other files and which is our configuration controlled version. If the content of the file version VSXPIY always contains the most recent version, then other files can refer to the VSXPIY version of the file and never have to update file references.

The first version sent out by VSOC is VS0PI0. When an instrument team provides an update the following steps happen:

- VSOC stores the updated file from the instrument team in the proper MTP directory
- the contents of the VS0PI1 file (or other updated version) is copied over the previous VSXPIY file (new file is given the name VSXPIY).
- VSXPIY gets added into CVS as the latest version of the VSXPIY file

This approach has the following advantages:

(1) - The instrument teams do not need to use CVS configuration control

(2) - VSOC does not need to change references made in files to the top-level files, because all changes will also consistently go into VSOC CVS in the VSXPIY file.

17.6.4 MTP ITL And PTR File Format

The MTP ITL files are in standard ITL format. The MTP PTR files are in standard PTR file format.

17.6.5 MTP ITL And PTR File Validation

MTP ITL and PTR files will be validated through use of the EPS software.

17.7 VSOC-generated MTP event file

17.7.1 Description

After the MTP PTR file has been submitted to the MOC and the contents are frozen, VSOC will start to generate the MTP event file. This Event File will contain the so-called LIMB events, which are important for upcoming ITLs which are scheduled relative to the LIMB. In addition the Event Files will contain the illumination events for the experiments, which will flag conflicts in case illumination constraints are violated.

These files are located in the directory VEX_SO\SAP\VMOC\FD

17.7.2 VSOC-generated MTP event file for MTP

The generated Event file will contain events for the complete MTP, with 2 orbits added before and after the MTP in order to make sure that the time span of the Event File is larger then the ITL and PTR file.

Format: EVTF_FDLVMA_DA_exe_MTPxxx___yyyy.EVF

where

xxx = the MTP number with leading zeroes
yyyy = FD Orbit file number which was used for generating the events

Examples: EVTF_FDLVMA_DA_exe_MTP003____00052.EVF
EVTF_FDLVMA_DA_exe_MTP004____00052.EVF

Please note that the process formerly stated that the VSOC Event File would be called MTPxxx event file.evf . MAPPS updates have allowed VSOC to create and read MTP-specific

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Formatiert: Nummerierung und Aufzählungszeichen
Formatiert: Überschrift 2
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Formatiert: Nummerierung und Aufzählungszeichen
Formatiert: Textkörper
Formatiert: Englisch (USA)
Formatiert: Englisch (Großbritannien)
Formatiert: Englisch (Großbritannien)
Formatiert: Portugiesisch (Brasilien)
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event files in the EVTF format, so that the use of the earlier MTPxxx_event_file.evf event files will be phased out.

The earlier MTP Event files had the following naming:

Format: MTPxxx_event_file.evf.

where

xxx = the MTP number with leading zeroes

Examples: MTP003_event_file.evf.
MTP004_event_file.evf.

This event file will include:

- the VSOC generated Event File

- the latest VMOC provided FECS File

17.7.3 VSOC generated Event File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

17.7.4 VSOC generated Event File Validation

The files will be validated through the use of the EPS software.

18 Short Term Planning (PIOR/PMRQ) Process

During Nominal Operations, the instrument teams will control their instruments using the PIOR/PMRQ mechanism. Both the PIOR and PMRQ are defined in some detail below, along with some information on the final POR file which is generated by SOC for delivery to the MOC.

Based on the harmonised MTP planning inputs (PTR and ITL), VSOC will use the EPS software (with EDF files and IBAT files as auxiliary input) to generate a PIOR file for instrument team review. The transformation from MTP ITL and PTR file to PIOR files will consist of the following:

- IBATS are resolved to telecommand (TC) sequences

- All operations are scheduled relative to pericenter

- Z-records with power and data-rate are used to forward the resource usage to the ESOC Mission Planning System (MPS)

- PTR 'Description' information is inserted as a comment for each orbit

Changes to the PIOR file are to be provided by the instrument teams to the SOC using the PMRQ files. During this iteration process, the instrument teams are forbidden to make changes in the PMRQ which would increase resource consumption (power or data-rate) of the experiments. This means that no observation can be added. Decrease of resource consumption (removal of observations) is allowed.

The PMRQs will overwrite the PIORs in the SOC planning system and it will be assured that the agreed PMRQs will be used by the SOC for generating the final POR files for delivery to the MOC for spacecraft commanding.

During this phase of the planning cycle, SOC is able to generate replacement PORs, on request from the instrument teams, providing there is no impact on the on-board resource usage. Such late changes are necessarily a marginal activity and their implementation is subject to the availability of sufficient staff at SOC and MOC to process the changes in time for uplink to the spacecraft.

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Gelöscht: three files: the Top Level Instrument Sequence (TLIS), the PIOR and the PMRQ.
Gelöscht: Each
Gelöscht: is
Gelöscht: The PI Teams will generate a TLIS file to provide their timed instrument activities for a particular orbit. The
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Formatiert: Schriftart: Kursiv
Gelöscht: SOC will re-run the procedure, and this will be iterated as often as necessary. Upon generation of a agreed upon PIOR file,
Gelöscht: es
Gelöscht: There is no other short term planning.¶

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

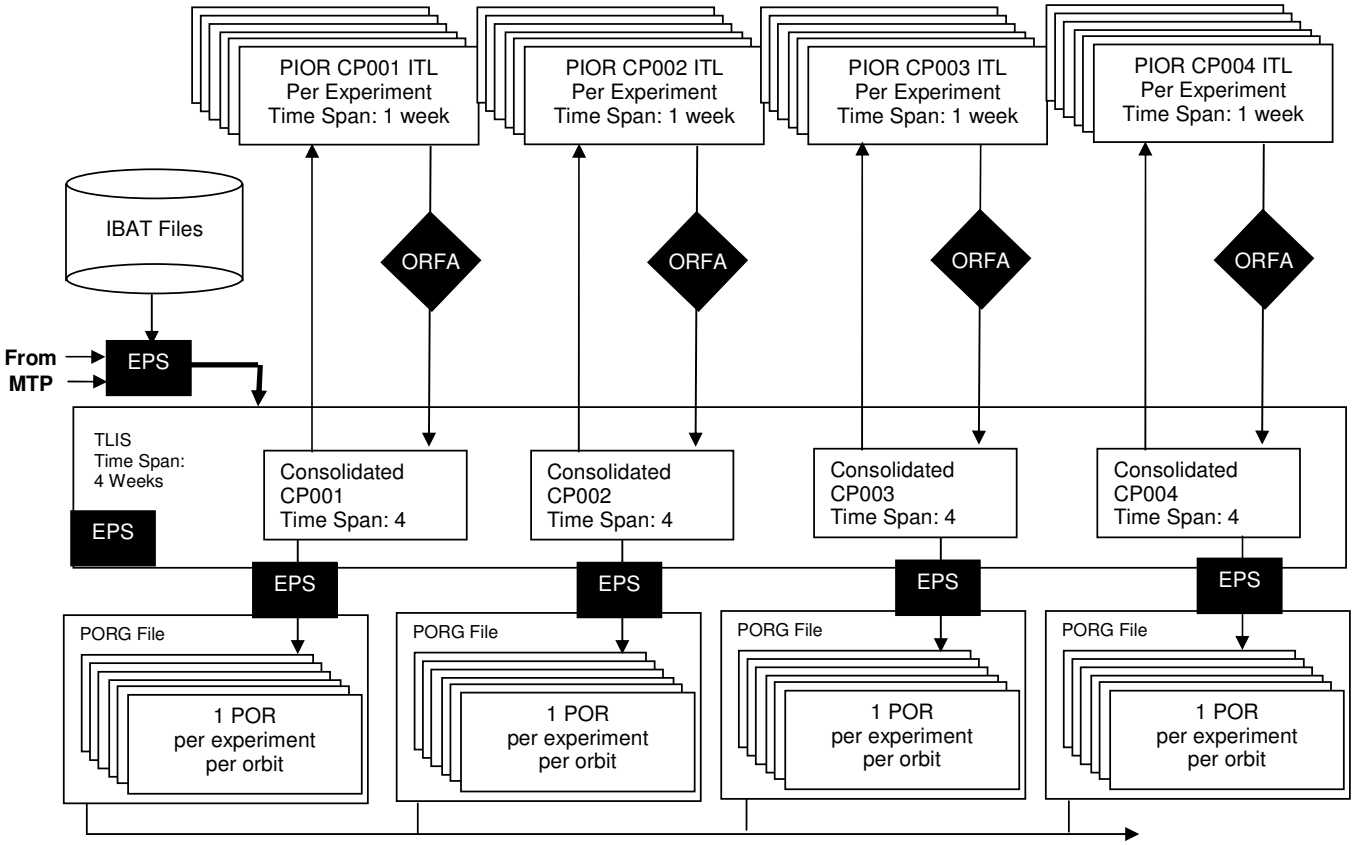

Figure 5: SOC Short Term Planning

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Formatiert: Nummerierung und Aufzählungszeichen

18.1 Commanding Periods

The basic unit of operational activity between SOC, the instrument Teams, and MOC during nominal operations will be the Commanding Period. Commanding Periods will always be a whole number of orbits. With an operational period of 24 hours, there are 7 orbits per Commanding Period during the nominal mission.

The flight dynamics orbits are defined to begin and end at Venus orbit apocenter (VAPO), and payload operations are generally related to Venus orbit pericenter (VPER). Each orbit contains a lengthy window of Earth communications, which occurs towards (but not exactly at) the end of the orbit. There is a small period of time between the end of the communications window and VAPO, the point at which the orbit number changes. Some payload operations for an orbit N will actually begin at the end of the previous orbit, N-1, after the end of the communications window. If the payload commanding files were strictly broken into discrete packages exactly at VAPO, then for one particular viewing opportunity some payload commands would be in the file for Orbit N-1, but the majority would be in the file for Orbit N. VMOC verifies that experiments are switched ON and OFF within the same file, so splitting observations between files is not allowed. This does not apply to continuously-operating experiments, such as ASPERA and MAG.

It is required that all the payload commands are grouped together for an observation. Rather than break the payload commands for orbit N into two files, one for Orbit N and one for Orbit N-1, the payload commanding files are shifted in time. For a particular day, the command files will start at VAPO – 6 hours, and end at VPER + 9 hours. This is what is called the Operational Orbit.

In addition to the individual command files, payload commanding is grouped into the weekly Command Periods. The weekly payload Commanding Period (CP) file will start at VAPO – 6 hours on Saturday (orbit N), and the CP will end on the following Saturday (orbit N+7), at VPER + 9 hours.

Note that the pericenter of the orbit that starts on Saturday will actually fall on Sunday. As the payload operations are related to pericenter, the payload operations will count the orbits from pericenter to pericenter and the planning in each CP (seven operational orbits) will be from Sunday VPER orbit to the following Saturday VPER orbit.

To summarize, see the description below and the accompanying diagram:

Commanding period N-1	terminates on Saturday at VPER(orbit i -1) + 9 hours
Commanding period N	begins on Saturday at VAPO(orbit i) – 6 hours
Commanding period N	terminates on Saturday at VPER(orbit i+7) - 9 hours
Commanding period N + 1	begins on Saturday at VAPO(orbit i+8) – 6 hours

Further details can be found in RD 05.

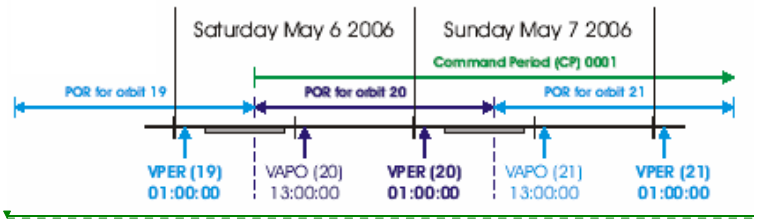

Figure 6: The operation Orbit visualized in a timeline

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Gelöscht: Commanding
Gelöscht: Periods
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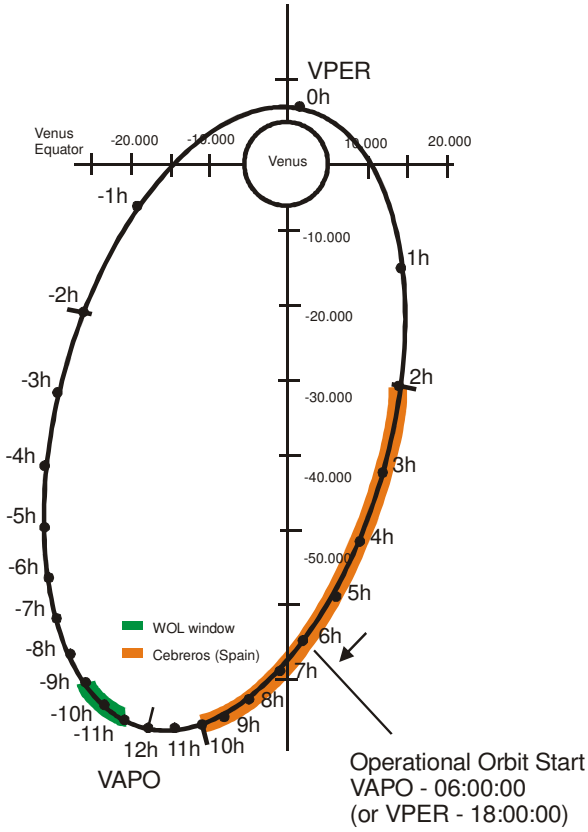

Figure 7: The Operational Orbit

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Gelöscht: 15
Gelöscht: May

18.2 STP ITL (PIOR/PMRQ) Files

The MTP ITL files will contain all mode changes for one instrument for one Commanding Period, which is then made available to the relevant instrument team for review. Because the instrument modes have been modeled in the EDF files of the VMIB, and because the mode transition commands are contained in the previously defined IBAT file, placing the time, the start mode and the finish mode is sufficient for the EPS software to create the commanding files.

The nominal operations defined in the file for a particular commanding period now need to be expressed in TC sequences in order to be useful to the MOC. This is done by running the EPS software at the SOC, using a file supplied by the instrument team that outlines their proposed operations for the commanding period. The information in the MTP ITL file is converted into TC sequences using the instrument modeling files created earlier: the EDF and IBAT files. This process creates the PI Operations Request (PIOR) file, which is the Short Term Planning ITL file. Each PIOR will contain all command requests (calls to command sequences) for one instrument for one Commanding Period. SOC then provides the PIOR file to the instrument teams for review

PIOR files are closely related to the Payload Observation Request files (PORs), which the SOC will use to send the command schedule to the MOC (see AD 02). PORs will be generated by taking PIORs for a Commanding Period, translating fields into the format required by the MOC and creating a POR for each instrument, for each orbit.

The VEX PIOR is a file that, for each VEX instrument, describes all planned operations for one Commanding Period (approximately 1 week). This file contains:

1. information that identifies the instrument and Commanding Period to which it applies;
2. information on the Command Sequences (CSEQ) to be applied to that instrument during that Commanding Period;
3. information on any non-default parameter values to be applied to each command sequence;
4. information on the instrument usage of spacecraft resources (power, data rate) associated with those CSEQs;
5. other contextual information that will assist PIs in reviewing PIOR content (e.g. payload level constraints such as pointing).

The SOC can provide the PIOR files to the instrument teams in either of two supported formats:

- ITL format – Similar to TLIS, but now with TC sequences
- POR format – Same as format that the SOC will eventually forward to VMOC

The SOC prefers that the instrument teams use the ITL format. This format is more human readable, and this will help to prevent some human errors in the file interpretation. The Experiment Planning System (EPS) is able to convert from ITL to POR and vice versa, so the instrument teams may request the input in either format. Providing the file in POR format simply

The SOC software which generates the PIOR files will insert comments into that file in order to delineate the blocks of command sequences which command each instrument activity, to assist the interpretation by instrument teams.

Formatiert: Nummerierung und Aufzählungszeichen

18.2.1 PIOR File Naming Convention

18.2.1.1 For complete payload

Format: `EX_XXXXXXXX_WWWW_WWWW__z_ NNNNNN.itl`
where

EX = PL when file is for all experiments

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Gelöscht: 15
Gelöscht: May

XXXXXXXX = CPxxxx__ (where xxxx__ is the Command Period number with leading zeroes, followed by two underscores)
WWWW_WWWW = <start_orbit>_<end_orbit> where orbit numbers are 4 characters with leading zeroes
__z = a version letter
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Further details on this version numbering can be found below in Section 0.

Examples: `PL_CP0008___0068_0074__A_OPS01A.itl`
`PL_CP0006___0054_0060__A_OPS01A.itl`

Formatiert: Nummerierung und Aufzählungszeichen

18.2.1.2 For experiments:

Format: `EX_XXXXXXXX_WWWW_WWWW__z_ NNNNNN.itl`
where

EX = the two letter abbreviation for the experiment (see Section 1.2)
XXXXXXXX = CPxxxx__ (where xxxx__ is the Command Period number with leading zeroes, followed by two underscores)
WWWW_WWWW = <start_orbit>_<end_orbit> where orbit numbers are 4 characters with leading zeroes
__z = a version letter
NNNNNN = the identifier of the updates made by VSOC and by the PI teams.
VSx - update made by VSOC
PIy - update made by PI team

Further details on this version numbering can be found below in Section 0.

Examples: `AS_CP0005___0047_0053__A_VSXPIY.itl`
`VR_CP0002___0023_0029__A_VS2PI1.itl`

Formatiert: Nummerierung und Aufzählungszeichen

18.2.2 Procedure To Verify Contents of PIOR File

The PIOR files are generated by the SOC using the EPS system with the MTP ITL, PTR and EDF files as inputs. The resulting PIOR text file is placed under configuration control at the SOC, and is then provided to the instrument teams for review.

When instrument teams wish to confirm the contents of a file as being OK, with no changes, they do the following:

- Confirm: if the file is accepted in its current format, the instrument team only needs to send an e-mail to the VSOC e-mail address, stating in the message Subject the name of the file, and adding after it the phrase "is verified". A copy of the file does not need to be renamed and returned; the e-mail verification is sufficient. And example message Subject line would be:

  Subject: VR_MTP002___0044_0071MOD_VS2PI0.itl is verified and OK

Formatiert: Nummerierung und Aufzählungszeichen

18.2.3 Procedure to Modify a PIOR File: Creating The PMRQ File

PI teams may need to make changes to the PIOR file contents. To do this, the PI team should directly edit the PIOR text file. This modified file is now called the PI Modification Request (PMRQ) file, which should be saved under a new file name that meets the PMRQ file naming convention. This PMRQ text file is then returned to the SOC. Since the SOC has the files under configuration control, the changes made by the instrument teams can be easily detected, and the original files can be updated.

When PI Teams wish to update a PIOR file to create the PMRQ, the PI team does two things:

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Gelöscht: May

- Modify: return the file with the updated values, with the file name updated to create the PMRQ. In the file name, the "PI(y)" in the name is changed to "PI(y+1)." For example, the PI team would change the file named *AS_MTP003___0072_0099MOD_VS0PI0.itl* to *AS_MTP003___0072_0099MOD_VS0PI1.itl*.
- Comments can be entered in the file so that instrument teams can track their changes. The name of the file in the header can also be updated to reflect the name change above.

Only part of the information contained in a PIOR is directly modifiable on instrument team instructions. The instrument teams may directly request changes to the time-tagged records (CSEQs, power, data rate) since these apply only to each team's instrument. **Only downward changes in the power and data rate are allowed within the ground segment.**

Requests for changes to higher-level payload issues, such as the pointing, shall be handled as described in AD 06. High-level payload information is included in the PIOR for information and context only.

SOC shall validate all PMRQ files. If the validation is successful, the PMRQ will then be used to prepare a new PIOR, which will be provided to the instrument team for verification.

Formatiert: Nummerierung und Aufzählungszeichen

18.2.3.1 PMRQ File Format

The PMRQ format is identical to that of the PIOR file. It shall be possible for instrument teams to generate the PMRQ file by editing the PIOR file with a text editor. This does not preclude the instrument teams from using a more sophisticated method for generating PMRQs from PIORs, but the provision of such tools is outside the scope of this ICD. SOC will view the change using the configuration control software, and the instrument teams must track their changes external to the file content.

Formatiert: Nummerierung und Aufzählungszeichen

18.2.3.2 PMRQ File Naming Convention

For the PMRQ files, the File Name Format is identical to the PIOR file name, with the exception of the PI version number.

For example, the instrument team would create the PMRQ by changing the PIOR file name *SI_CP0005___0048_0054__A_VS0PI0.itl* to *SI_CP0001___0050_0057__A_VS0PI1.itl*

Formatiert: Nummerierung und Aufzählungszeichen

18.2.3.3 Validation

The front-end of the SOC PMRQ ingestion process will check the format of the PMRQ and will reject it if it is non-compliant.

If either a power (type "P") or a data rate (type "D") record is changed to increase that resource allocated to the instrument, the PMRQ will be rejected by SOC. Similarly, if these records are changed to reduce that resource to an unrealistically low level (e.g. zero data rate during instrument activities), then the PMRQ may also be rejected by SOC.

Inclusion of a CSEQ name which is not in the SOC commanding database will also lead to a rejection of the PMRQ.

While SOC will make reasonable efforts to trap errors in PMRQs and the subsequent PIORs, the ultimate responsibility for the correctness of PMRQ content lies with the Principle Investigator.

Formatiert: Nummerierung und Aufzählungszeichen

18.3 Configuration control strategy:

When we run the MTP or STP files, we always keep the VSXPIY as the operational file that is referred to in other files and which is our configuration controlled version. The first version we send out is VS0PI0. When the instrument team provides an update the following steps happen:

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Gelöscht: May

- we store the updated file from the instrument team in the proper MTP or STP directory
- the VS0PI1 file (or other updated version) is copied over the previous VSXPIY file (new file is given the name VSXPIY).
- VSXPIY gets added into CVS as the latest version of the VSXPIY file

This approach has the following advantages:

(1) - The instrument teams do not need to use CVS configuration control

(2) - VSOC does not need to change references made in files to the top-level files, because all changes will also consistently go into VSOC CVS in the VSXPIY file.

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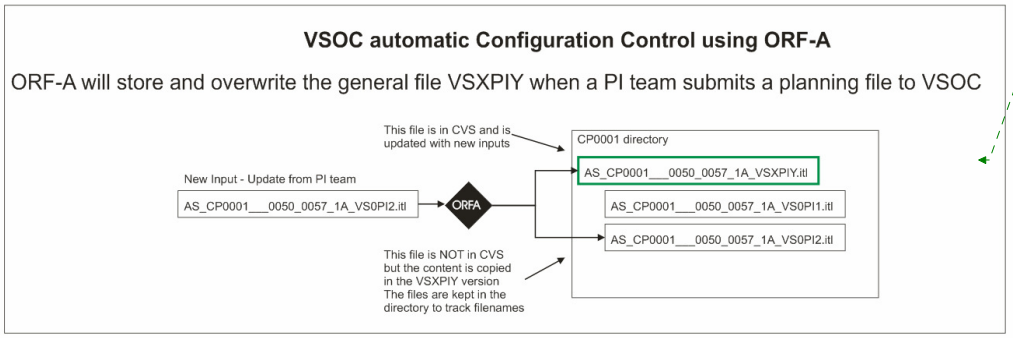

Figure 17-1 – Overview of the VSOC configuration control strategy

Formatiert: Nummerierung und Aufzählungszeichen

18.4 Validation

The validation of PIOR format will be demonstrated during unit level and integration testing. In the latter, the independently written POR generator will read the PIOR and check its format and syntax.

The contents of a generated PIOR – the CSEQs, parameter numbers and type which it contains – are validated through the VEX Commanding database.

Formatiert: Nummerierung und Aufzählungszeichen

18.5 Payload Operations Request File

As described above, PIOR files will be created for a command period, for each instrument and will contain the planned commanding for an instrument. Any PIOR file changes will be requested by the instrument teams via PMRQ files, and those changes will be incorporated. Then, the SOC will use the EPS software to create the final commanding files that will be sent to the MOC for the commanding period in question.

The command files sent to the MOC are called the Payload Operations Request (POR) files. There is one for each instrument, for each orbit. Given seven instruments, and seven orbits per commanding period, the SOC will provide 49 POR files for each commanding period.

To minimize confusion due to the large number of files, the SOC will create one ZIP file per instrument, per commanding period, that contains the seven required POR files. This grouped POR file (PORG) will be sent to the MOC. Therefore, each week the SOC will deliver seven PORG files to the MOC, one for each experiment.

The POR and PORG files are not provided to the instrument teams, and so are outside the scope of this document and only discussed here for informational purposes.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

18.5.1 POR Naming convention

Formatiert: Nummerierung und Aufzählungszeichen

See AD 02, the Command Request Interface Document (CRID), Command Request Files section.

18.5.2 PORG Naming convention

Formatiert: Nummerierung und Aufzählungszeichen

A PORG contains 7 PORs per experiment. The POR version numbers are increased by one per experiment, not by orbit number.

For example, in the PORG for experiment EX1 you find POR versions 00001 to 00007. For experiment EX2, POR version numbers will be 00008 to 00014.

18.5.3 POR Configuration Control

Formatiert: Nummerierung und Aufzählungszeichen

These files will be configuration controlled with unique filenames by CVS.

18.5.4 POR Format

Formatiert: Nummerierung und Aufzählungszeichen

See AD02, CRID, for information on Command Request Files (CRF), as well as specific VEX examples.

18.6 STP PTR

Formatiert: Nummerierung und Aufzählungszeichen

No changes are allowed to the Pointing Request (PTR) files in the short term planning cycle. There are no STP PTR files. The MTP PTR file is the operational file.

19 Very Short Term Planning

Formatiert: Nummerierung und Aufzählungszeichen

This planning cycle is not relevant to the payload.

20 Scheduling The SOC And Instrument Team Activities

Formatiert: Nummerierung und Aufzählungszeichen

The preparation of the payload command schedule requires the instrument teams to meet various deadlines for the delivery of inputs to SOC, e.g. PIOR e-mail messages to approve a PIOR or modify it with a PMRQ. The schedule of deadlines for each Commanding Period will be made available to the instrument teams via VSOCWeb and/or Microsoft Project files. All deadlines will be expressed as dates. To ensure inclusion, the instrument team inputs need to reach the SOC by 1700 UTC on the day of the deadline. Similarly, SOC will have deadlines for PIOR release to enable the PIOR-PMRQ cycle to be completed in time to send the PORs to ESOC on schedule.

The deadline for PIOR approval at the end of each PIOR-PMRQ cycle corresponds to the day in the commanding cycle on which SOC will start to process the PIORs to produce the final PORs for ESOC. The status of relevant PIORs available at SOC will be checked at the initial stage of processing. If any inputs are missing, i.e. PIORs are not approved, possibly awaiting further modification by PMRQ, SOC will:

- immediately inform the appropriate PI(s) and any other nominated person(s) for command issues for the instruments affected;
- continue processing using the default actions for the affected instrument. If non-approval of the PIOR is likely to delay the delivery of the POR to ESOC then SOC will assume the current PIOR is to be approved by default.
- inform the Project Scientist of the missing inputs and of the default actions taken.

Formatiert: Nummerierung und Aufzählungszeichen

If PMRQ inputs are received from instrument teams after the deadline, SOC shall attempt to include them in the processing chain on a reasonable-efforts basis only – but their inclusion cannot be guaranteed.

Formatiert: Nummerierung und Aufzählungszeichen

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

21 Calibration Support Products for Instrument & Science Teams

21.1 General Description

The VEX L1b processor software provides VSOC with the capability for independent processing of any type of spacecraft telemetry data. A number of specific data products are generated for supporting the work of VEX instrument teams and other associated engineers and scientists. This chapter provides an overview of the telemetry data processing system and the available data products. The procedure for requesting data is explained, and the interface to the users of those data products is defined.

Formatiert: Nummerierung und Aufzählungszeichen

21.2 L1b Processor Data Pipeline

The L1b processor pipeline is a system supporting the automated generation of PDS archive compatible data products from raw spacecraft or instrument telemetry data files. The pipeline is hosted on a Unix computer system at VSOC (bonobo.estec.esa.int).

TM data files are downloaded from the ESOC DDS on a daily basis, and processed by dedicated instances of the L1b processor software using information from specific sets of configuration files. DDS data requests are typically sent a few hours after the end of a data downlink window, and the PDS compatible output data files are available after a short time.

The output data products for external users (instrument teams and supporting engineers and scientists) are delivered to directories in VSOC's public ftp area, where they can be picked up by the users. Data products for internal users are kept in VSOC's protected data areas.

Formatiert: Nummerierung und Aufzählungszeichen

21.3 Requesting L1b Processor Data products from VSOC

Instrument teams and associated scientists may request calibration support data (processed spacecraft housekeeping data) from VSOC at any time.

VSOC will handle these requests as follows:

- In case the data is available to VSOC, it will initially be provided in tabular form (or, if requested and possible, in the form of MATLAB compatible data files).
- In case the instrument team decides that the data will be required on a frequent basis throughout the rest of the mission, or for a timeframe that justifies setting up a dedicated data pipeline, VSOC will set up a L1B processor data pipeline, including configuration files and – if necessary – calibration routines for the required data. This data pipeline will request the corresponding TM data from the ESOC VEX DDS on a daily basis, process this data, generate PDS compatible data files, and make these files available to the instrument team via public ftp. The instrument team shall take care of the data retrieval to their own platforms, and shall include the data in their deliveries to the PSA in case the data is used for calibration purposes, or as an input to the team's data pipelines.
- Data requests to VSOC will, in general, be processed on a first-come, first-served, best-effort basis.

Requests for data products should be sent to

Mr. Roland Trautner, Data Processing Engineer, Roland.Trautner@esa.int

With copy to

Mr. Joe Zender, Data Archive Manager, Joe.Zender@esa.int

Mr. Hakan Svedhem, VEX Project Scientist, Hakan.Svedhem@esa.int

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Requests for data shall include the following information:

- Type of required data, including details
- Explanation why data is required and how it will be used
- Data APID, type and subtype, P1Val, other parameters required for data extraction
- Requirements with respect to PDS data files (otherwise VSOC will define)

NOTE: In the general case of automated processing, data can only be requested, processed and delivered on a daily basis. Data for each day is requested according to on-board generation time.

The following chapters describe the individual data products delivered to external users, as well as their data formats, ftp location, and other details.

Formatiert: Nummerierung und Aufzählungszeichen

21.4 VEX MAG Team Calibration Support Products

The VEX magnetometer sensors are effected by a number of spacecraft internal magnetic field sources. The distortions caused by these sources have to be eliminated in order to obtain good measurements of the ambient magnetic field. The following products are used in the calibration process of the MAG senor data.

Formatiert: Nummerierung und Aufzählungszeichen

21.4.1 Solar Array Drive Mechanism (SADE) Data

Data description

The solar array drive mechanisms include electric motors which create a position-dependent distortion field. Therefore data on the solar array position needs to be available for calibration.

S/C Housekeeping parameters

The following spacecraft TM parameters (names from ESOC's VEX parameter database) shall be provided:

```
SADE A NSAAW100
SADE A NSAAW200
SADE B NSAAR100
SADE B NSAAR200
```

FTP data location

Host:	gorilla.estec.esa.int
Directory:	/pub/projects/VenusExpress/data/L1B/MAG
User / password:	anonymous / none

Data file timeframe

Each data file shall contain data for 1 day (day X 00:00:00 ≤ t < day x+1 00:00:00). All times are in UTC.

File name

Naming convention:	`V_SC_YYMMDD_SADE.TAB`
Example:	`V_SC_060716_SADE.TAB`

Product PDS label (Example)

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

```
PDS_VERSION_ID                = PDS3
RECORD_TYPE                   = FIXED_LENGTH
RECORD_BYTES                  = 72
LABEL_RECORDS                 = 199
FILE_RECORDS                  = 1549
FILE_NAME                     = "VEX_SC_060301_SADE.TAB"
DATA_SET_ID                   = "VEX-X-AUX-3-V1.0"
DATA_SET_NAME                 = "VENUS EXPRESS OTHER AUXILIARY 3 VERSION 1.0"
PRODUCT_ID                    = VEX_SC_060301_SADE
PRODUCT_CREATION_TIME         = 2006-11-08T19:00:27
PRODUCT_TYPE                  = RDR
MISSION_ID                    = VEX
MISSION_NAME                  = "VENUS EXPRESS"
MISSION_PHASE_NAME            = "CRUISE"
ORBIT_NUMBER                  = "N/A"
START_ORBIT_NUMBER            = 1
STOP_ORBIT_NUMBER             = 1
INSTRUMENT_HOST_ID            = VEX
INSTRUMENT_HOST_NAME          = "VENUS EXPRESS"
INSTRUMENT_ID                 = "NULL"
INSTRUMENT_NAME               = "NULL"
INSTRUMENT_TYPE               = "HOUSEKEEPING"
TARGET_NAME                   = "OTHER"
TARGET_TYPE                   = "N/A"
START_TIME                    = 2006-03-01T00:00:37
STOP_TIME                     = 2006-03-01T23:59:33
SPACECRAFT_CLOCK_START_COUNT  = "1/31536039.3768"
SPACECRAFT_CLOCK_STOP_COUNT   = "1/31622375.3768"
PRODUCER_ID                   = "ESA_ESTEC"
PRODUCER_FULL_NAME            = "ROLAND TRAUTNER"
PRODUCER_INSTITUTION_NAME     = "ESA_ESTEC"
DATA_QUALITY_ID               = 1
DATA_QUALITY_DESC             = "1 FOR GOOD, 2 FOR BAD QUALITY"
NOTE                          = "THIS DATA PRODUCT HAS BEEN GENERATED BY THE
                                 VSOC L1B PROCESSOR SOFTWARE.

                                 INPUT FILES USED:
                                 V_GEN_HK_260_060301.dat
                                 VEX_SC_260_SADE_V1.tcf
                                 VEX_SC_260_SADE_V1.dcf
                                 VEX_SC_260_SADE_V1.pcf

                                 SPICE KERNELS USED:
                                 vex_meta.ker
                                 NAIF0008.TLS
                                 VEX_060726_STEP.TSC

                                 SOLAR ARRAY POSITION DATA ARE DERIVED FROM
                                 VEX SPACECRAFT HOUSEKEEPING DATA PACKETS,
                                 APID 260."

FLIGHT_SOFTWARE_VERSION_ID    = "N/A"

^SADE_TABLE                   = 200

OBJECT                        = SADE_TABLE
NAME                          = "SOLAR ARRAY ANGLE DATA TABLE"
INTERCHANGE_FORMAT            = ASCII
ROWS                          = 1350
COLUMNS                       = 5
ROW_BYTES                     = 72

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

OBJECT                        = COLUMN
NAME                          = "SADE A NSAAW100"
COLUMN_NUMBER                 = 2
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 27
BYTES                         = 11
UNIT                          = "deg"
DESCRIPTION                   = "SADE A ShaftEncod Pos +Y"
END_OBJECT                    = COLUMN

OBJECT                        = COLUMN
NAME                          = "SADE A NSAAW200"
COLUMN_NUMBER                 = 3
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 38
BYTES                         = 11
UNIT                          = "deg"
DESCRIPTION                   = "SADE A ShaftEncod Pos -Y"
END_OBJECT                    = COLUMN

OBJECT                        = COLUMN
NAME                          = "SADE B NSAAR100"
COLUMN_NUMBER                 = 4
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 49
BYTES                         = 11
UNIT                          = "deg"
DESCRIPTION                   = "SADE B ShaftEncod Pos +Y"
END_OBJECT                    = COLUMN

OBJECT                        = COLUMN
NAME                          = "SADE B NSAAR200"
```

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

```
COLUMN_NUMBER                = 4
DATA_TYPE                    = ASCII_REAL
START_BYTE                   = 60
BYTES                        = 11
UNIT                         = "deg"
DESCRIPTION                  = "SADE B ShaftEncod Pos -Y"
END_OBJECT                   = COLUMN

END_OBJECT                   = SADE_TABLE


END


2006-03-01T00:00:37.989101 5.5657E+01-5.5591E+01 6.9351E+01-6.9346E+01
2006-03-01T00:01:41.989111 5.5657E+01-5.5591E+01 6.9351E+01-6.9346E+01
2006-03-01T00:02:45.989122 5.5657E+01-5.5591E+01 6.9351E+01-6.9346E+01
…
```

Formatiert: Nummerierung und Aufzählungszeichen

21.4.2 Reaction Wheel Momentum Data

Data description

The reaction wheels onboard VEX create a magnetic field which leads to distortions of the magnetic field at the sensor positions. The wheel momentum, which is proportional to the wheel rpm, is available as a HK parameter and is used for data cleaning and calibration.

S/C Housekeeping parameters

The following S/C TM parameters (names from ESOC's VEX parameter database) shall be provided:

```
RW1 NACW0G06
RW2 NACW0G0I
RW3 NACW0G0U
RW4 NACW0G16
```

FTP data location

Host:	gorilla.estec.esa.int
Directory:	/pub/projects/VenusExpress/data/L1B/MAG
User / password:	anonymous / none

File name

Naming convention:	`V_SC_YYMMDD_RWHEELS.TAB`
Example:	`V_SC_060716_RWHEELS.TAB`

Data file timeframe

Each data file shall contain data for 1 day (day X 00:00:00 ≤ t < day x+1 00:00:00). All times are in UTC.

Product PDS label (Example)

```
PDS_VERSION_ID               = PDS3
RECORD_TYPE                  = FIXED_LENGTH
RECORD_BYTES                 = 64
LABEL_RECORDS                = 199
FILE_RECORDS                 = 21799
FILE_NAME                    = "VEX_SC_060301_RWHEELS.TAB"
DATA_SET_ID                  = "VEX-X-AUX-3-V1.0"
DATA_SET_NAME                = "VENUS EXPRESS OTHER AUXILIARY 3 VERSION 1.0"
PRODUCT_ID                   = VEX_SC_060301_RWHEELS
PRODUCT_CREATION_TIME        = 2006-11-08T13:26:38
PRODUCT_TYPE                 = RDR
MISSION_ID                   = VEX
MISSION_NAME                 = "VENUS EXPRESS"
MISSION_PHASE_NAME           = "CRUISE"
ORBIT_NUMBER                 = "N/A"
START_ORBIT_NUMBER           = 1
STOP_ORBIT_NUMBER            = 1
INSTRUMENT_HOST_ID           = VEX
INSTRUMENT_HOST_NAME         = "VENUS EXPRESS"
```

Gelöscht: 0

Gelöscht: 15

Gelöscht: May

```
INSTRUMENT_ID                  = "NULL"
INSTRUMENT_NAME                = "NULL"
INSTRUMENT_TYPE                = "HOUSEKEEPING"
TARGET_NAME                    = "OTHER"
TARGET_TYPE                    = "N/A"
START_TIME                     = 2006-03-01T00:00:02
STOP_TIME                      = 2006-03-01T23:59:58
SPACECRAFT_CLOCK_START_COUNT   = "1/31536004.3755"
SPACECRAFT_CLOCK_STOP_COUNT    = "1/31622400.3755"
PRODUCER_ID                    = "ESA_ESTEC"
PRODUCER_FULL_NAME             = "ROLAND TRAUTNER"
PRODUCER_INSTITUTION_NAME      = "ESA_ESTEC"
DATA_QUALITY_ID                = 1
DATA_QUALITY_DESC              = "1 FOR GOOD, 2 FOR BAD QUALITY"
NOTE                           = "THIS DATA PRODUCT HAS BEEN GENERATED BY THE
                                  VSOC L1B PROCESSOR SOFTWARE.

                                  INPUT FILES USED:
                                  V_GEN_HK_212_060301.dat
                                  VEX_SC_212_RWHEELS_V1.tcf
                                  VEX_SC_212_RWHEELS_V1.dcf
                                  VEX_SC_212_RWHEELS_V1.pcf

                                  SPICE KERNELS USED:
                                  vex_meta.ker
                                  NAIF0008.TLS
                                  VEX_060726_STEP.TSC

                                  REACTION WHEEL ANGULAR MOMENTUM DATA
                                  ARE DERIVED FROM VEX SPACECRAFT HOUSEKEEPING
                                  DATA PACKETS WITH APID 212."

FLIGHT_SOFTWARE_VERSION_ID     = "N/A"

^MOM_TABLE                     = 200

OBJECT                         = MOM_TABLE
NAME                           = "REACTION WHEEL ANGULAR MOMENTUM TABLE"
INTERCHANGE_FORMAT             = ASCII
ROWS                           = 21600
COLUMNS                        = 5
ROW_BYTES                      = 64

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

OBJECT                         = COLUMN
NAME                           = "RW1 NACW0G06"
COLUMN_NUMBER                  = 2
DATA_TYPE                      = ASCII_REAL
START_BYTE                     = 27
BYTES                          = 9
UNIT                           = "Nms"
DESCRIPTION                    = "REACTION WHEEL 1 - ANGULAR MOMENTUM"
END_OBJECT                     = COLUMN

OBJECT                         = COLUMN
NAME                           = "RW2 NACW0G0I"
COLUMN_NUMBER                  = 3
DATA_TYPE                      = ASCII_REAL
START_BYTE                     = 36
BYTES                          = 9
UNIT                           = "Nms"
DESCRIPTION                    = "REACTION WHEEL 2 - ANGULAR MOMENTUM"
END_OBJECT                     = COLUMN

OBJECT                         = COLUMN
NAME                           = "RW3 NACW0G0U"
COLUMN_NUMBER                  = 4
DATA_TYPE                      = ASCII_REAL
START_BYTE                     = 45
BYTES                          = 9
UNIT                           = "Nms"
DESCRIPTION                    = "REACTION WHEEL 3 - ANGULAR MOMENTUM"
END_OBJECT                     = COLUMN

OBJECT                         = COLUMN
NAME                           = "RW4 NACW0G16"
COLUMN_NUMBER                  = 5
DATA_TYPE                      = ASCII_REAL
START_BYTE                     = 54
BYTES                          = 9
UNIT                           = "Nms"
DESCRIPTION                    = "REACTION WHEEL 4 - ANGULAR MOMENTUM"
END_OBJECT                     = COLUMN

END_OBJECT                     = MOM_TABLE


END

2006-03-01T00:00:02.988896    6.457   -6.065    3.648   -3.751
2006-03-01T00:00:06.988897    6.458   -6.067    3.648   -3.751
2006-03-01T00:00:10.988898    6.456   -6.067    3.649   -3.752
2006-03-01T00:00:14.988898    6.457   -6.066    3.648   -3.751
...
```

Formatiert: Nummerierung und Aufzählungszeichen

21.5 ACC Science Team Data Products

Data description

The VEX spacecraft uses, in addition to the star trackers, 2 Inertial Measurement Units (IMUs) for attitude measurements and determination of accelerations. The integrated accelerometer data is available as a HK parameter, and can be used for the assessment of the atmospheric drag experienced by the VEX spacecraft in the uppermost layers of the Venus' atmosphere.

S/C Housekeeping parameters

The following S/C TM parameters (names from ESOC's VEX parameter database) shall be provided:

```
ACC-X NACW0P03
ACC-Y NACW0P04
ACC-Z NACW0P05
```

FTP data location

Host:	gorilla.estec.esa.int
Directory:	/pub/projects/VenusExpress/data/L1B/ACC
User / password:	anonymous / none

File name

Naming convention:	`V_SC_YYMMDD_IMU-ACC.TAB`
Example:	`V_SC_060716_IMU-ACC.TAB`

Data file timeframe

Each data file shall contain data for 1 day (day X 00:00:00 ≤ t < day x+1 00:00:00). All times are in UTC.

Product PDS label (Example)

```
PDS_VERSION_ID                = PDS3
RECORD_TYPE                   = FIXED_LENGTH
RECORD_BYTES                  = 61
LABEL_RECORDS                 = 199
FILE_RECORDS                  = 2224
FILE_NAME                     = "VEX_SC_060301_IMU-ACC.TAB"
DATA_SET_ID                   = "VEX-X-AUX-3-V1.0"
DATA_SET_NAME                 = "VENUS EXPRESS OTHER AUXILIARY 3 VERSION 1.0"
PRODUCT_ID                    = VEX_SC_060301_IMU-ACC
PRODUCT_CREATION_TIME         = 2006-11-08T11:05:00
PRODUCT_TYPE                  = RDR
MISSION_ID                    = VEX
MISSION_NAME                  = "VENUS EXPRESS"
MISSION_PHASE_NAME            = "CRUISE"
ORBIT_NUMBER                  = "N/A"
START_ORBIT_NUMBER            = 1
STOP_ORBIT_NUMBER             = 1
INSTRUMENT_HOST_ID            = VEX
INSTRUMENT_HOST_NAME          = "VENUS EXPRESS"
INSTRUMENT_ID                 = "NULL"
INSTRUMENT_NAME               = "NULL"
INSTRUMENT_TYPE               = "HOUSEKEEPING"
TARGET_NAME                   = "OTHER"
TARGET_TYPE                   = "N/A"
START_TIME                    = 2006-03-01T00:00:21
STOP_TIME                     = 2006-03-01T23:59:25
SPACECRAFT_CLOCK_START_COUNT  = "1/31536023.3774"
SPACECRAFT_CLOCK_STOP_COUNT   = "1/31622367.3768"
PRODUCER_ID                   = "ESA_ESTEC"
PRODUCER_FULL_NAME            = "ROLAND TRAUTNER"
PRODUCER_INSTITUTION_NAME     = "ESA_ESTEC"
DATA_QUALITY_ID               = 1
DATA_QUALITY_DESC             = "1 FOR GOOD, 2 FOR BAD QUALITY"
NOTE                          = "THIS DATA PRODUCT HAS BEEN GENERATED BY THE
                                 VSOC L1B PROCESSOR SOFTWARE.

                                 INPUT FILES USED:
                                 V_GEN_HK_260_060301.dat
                                 VEX_SC_260_ACC_V2.tcf
                                 VEX_SC_260_ACC_V2.dcf
```

Gelöscht: 0

Gelöscht: 15

Gelöscht: May

```
                                VEX_SC_260_ACC_V1.pcf

                                SPICE KERNELS USED:
                                vex_meta.ker
                                NAIF0008.TLS
                                VEX_060726_STEP.TSC

                                X/Y/Z VELOCITY DATA ARE DERIVED FROM
                                VEX SPACECRAFT HOUSEKEEPING DATA PACKETS
                                WITH APID 260."

FLIGHT_SOFTWARE_VERSION_ID    = "N/A"

^ACC_TABLE                    = 200

OBJECT                        = ACC_TABLE
NAME                          = "IMU ACCELEROMETER VELOCITY DATA TABLE"
INTERCHANGE_FORMAT            = ASCII
ROWS                          = 2025
COLUMNS                       = 4
ROW_BYTES                     = 61

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

OBJECT                        = COLUMN
NAME                          = "ACC-X NACW0P03"
COLUMN_NUMBER                 = 2
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 27
BYTES                         = 11
UNIT                          = "m/s"
COORDINATE_SYSTEM_NAME        = "SC_REFERENCE_FRAME"
DESCRIPTION                   = "IMU ACCELEROMETER X AXIS, INTEGRATED"
END_OBJECT                    = COLUMN

OBJECT                        = COLUMN
NAME                          = "ACC-Y NACW0P04"
COLUMN_NUMBER                 = 3
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 38
BYTES                         = 11
UNIT                          = "m/s"
COORDINATE_SYSTEM_NAME        = "SC_REFERENCE_FRAME"
DESCRIPTION                   = "IMU ACCELEROMETER Y AXIS, INTEGRATED"
END_OBJECT                    = COLUMN

OBJECT                        = COLUMN
NAME                          = "ACC-Z NACW0P05"
COLUMN_NUMBER                 = 4
DATA_TYPE                     = ASCII_REAL
START_BYTE                    = 49
BYTES                         = 11
UNIT                          = "m/s"
COORDINATE_SYSTEM_NAME        = "SC_REFERENCE_FRAME"
DESCRIPTION                   = "IMU ACCELEROMETER Z AXIS, INTEGRATED"
END_OBJECT                    = COLUMN

END_OBJECT                    = ACC_TABLE


END


2006-03-01T00:00:21.989189 1.9728E-03-1.3616E-03-6.8951E-04
2006-03-01T00:00:29.989099-3.1638E-03 1.8712E-03-2.6473E-03
2006-03-01T00:01:33.989110 2.0007E-04-3.3287E-03 3.6876E-04
2006-03-01T00:02:29.989211 1.9494E-03-1.3092E-03-6.5262E-04
```

Formatiert: Nummerierung und Aufzählungszeichen

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

22 Overview of Operational Constraints

There are a large number of constraints on instrument operations. These constraints can be found in a number of documents. This section will try to collect some of the constraints which the instrument teams must be aware of, along with a reference to where more detail can be found.

Constraint	Comment	Reference
Wheel off-loadings must be performed within 4 hours of apogee (APO ± 4 hours). In each orbit, a two-hour block must be reserved for WOL within this window.	The thruster firings are used to maintain spacecraft position when the reaction wheels are moved to their zero momentum positions. Keeping thruster firings centered near apocenter minimize orbit perturbations, thereby requiring fewer orbit correction maneuvers, which allow more uninterrupted days of science observations.	SOIA Appendix D (Flight Dynamics – VSOC ICD)
OCM maneuvers preclude observations for one orbit	When OCMs are scheduled, no science observations will take place in the orbit.	
22 Hour Thermal Rule	If a sensitive face of the spacecraft (any face other than +X or +Z) is illuminated, 22 hours in cooling orientation (only +X or +Z is illuminated) must be scheduled.	FOP (TBC)
Alternating Case 3 and Case 2 observations	In order to track atmospheric features, Case 2 and Case 3 observations will be scheduled for 10 observations in a row, whenever possible. For example, 10 Case 3 observations, then 10 Case 2 observations, and repeated.	VIRTIS team communication
Restricted downlink durations due to station maintenance	When maintenance is scheduled for the CEB station, the downlink duration will be reduced, limiting the science observations prior to that downlink period. The allowable downlink data volume will be calculated and provided in the MSP.	VMOC communication
Science Observations can occur while cooling	Thomas Schirmann of Astrium has verified for Vicente Companys of FD that it is acceptable have science observations during cooling (i.e. to run observations that have no illumination of radiative phases during cooling.	e-mail, Wed 5/10/2006
Transmitters ON only in Earth Pointing	The S/C cannot be pointed to NADIR while the transmitter is switched ON in preparation for a Bi-Static Radar observation. This is not allowed by the Astrium rules, as the transmitter uses a lot of power. Astrium requires the S/C to be in EARTH/CUSTOM/SLEW pointing in order to have the transmitter ON.	
VeRa Observation Ground Station Calibration and Slews	VeRa has an operational constraint which requires the S/C to be in Earth Pointing in order to make a calibration with the Ground Station.	e-mail, 11.05.06, R. Hoofs
VeRa Case 4 and Case 8 Pre- and Post-Observation	For TV Case #4 and 8, PTR files must include a pre-observation slew 30 minute before and	Riccardo Mattei, TV_MTP004,

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Constraint	Comment	Reference
Slews	post-observation slew 30 minutes after the observation to Earth Pointing. Note that OCCULTATION_START and OCCULTATION_END attitudes practically coincide with the EARTH_POINTING attitude, as VeRa starts and ends their CUSTOM_POINTING at a 250 km height from the planet surface, where the ray bending is not appreciable.	5/11/2006
Earth Pointing must be for at least 5 minutes	EARTH pointing lasting less than 5 minutes should be avoided – causes Flight Dynamics commanding to overlap.	VV Planning Meeting MOM, Week 19.
Slews around pericenter for NADIR pointing can break	For the PTR generation, a problem can occur for the slew calculation close to pericenter for NADIR pointings. The problems is the high angular rate when the S/C is NADIR pointing around pericenter. When the PTR software calculates the slew (without margin), it assumes a slew over a certain angular distance. When the margin is applied, this slew might break, because the extra slew time for the margin also results in a bigger angular distance the spacecraft must slew. This problem can only be solved by specifying a specific slew time, using the SMOOTH slew option. VSOC planners should be aware of the fact that this error can occur.	e-mail, R. Hoofs, 02.06.06
Short duration pointing requests	With the current definition of TC sequences in the VMIB, it is only possible to support pointings with a minimum duration of 3 minutes (from entry into FPAP to entry in GSP). There are cases such as for SOIR calibrations which require pointings of shorter duration (in this case, 1 min.). Since these special pointings are not expected to occur very often (maximum once per month) it is not currently deemed necessary to update the VMIB accordingly. The following manual procedure will therefore apply : 1) VSOC informs VMOC at MTP level when special pointings are needed. 2) The pointing products are resource checked as usual within the MPS planning cycle by VMOC. 3) VMOC manually adapts the S/C commanding to handle the pointings.	SOIA , VEX-ESC-IF-5005, Issue1.2, Page 37

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Constraint	Comment	Reference
20 minute margin between absolute scheduled events and relative scheduled operations	There should be 20 minutes margin between operations which are scheduled relative to VPER and have a constraint with an absolute timed event, such as the CEB ground station. This is because the deviation of the FD orbit could be as big a 20 minutes.	AD 05

Formatiert: Englisch (Großbritannien)

Formatiert: Nummerierung und Aufzählungszeichen

23 On-board Software Maintenance

23.1 Description

The Venus Express 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.

Formatiert: Nummerierung und Aufzählungszeichen

23.2 Onboard Software Maintenance Responsibilities

The SOC 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 MOC 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.

Formatiert: Nummerierung und Aufzählungszeichen

23.3 Memory Patch Requests (MPRP)

23.3.1 Description

The Venus Express payload instruments provide the capability to the user to reprogram their internal software. Instrument software patches can range in complexity from simple updates of parameters to significant modifications of the executable code. This is expected to be used during the mission, although as an exceptional measure and not as a routine operation.

On-board software running in the experiments can be patched by using the Memory Patch Request.

Formatiert: Nummerierung und Aufzählungszeichen

23.3.2 File naming convention

The file name shall be as follows:

```
12345678901234567890123456789012345678901234567
tttt_sssVSO_Dxxxxxxx_________vvvvv.VEX
```

with

- `tttt` The type of the file, always a Memory Patch Request ('`MPRP`').
- `sss` The source of the file, a three letter mnemonic, taken from the CRID Appendix C. See Table 8.

Table 8: MPRP Sources

Instrument	Source Mnemonic
ASPERA	PVA
MAG	PVB
PFS	PVC

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

SPICAV	PVD
VERA	PVF
VIRTIS	PVE
VMC	PVG

- VSO The destination of the file, a three letter mnemonic indicating the SOC and always VSO for Venus Express.
- xxxxxxx A free information field. This will be forwarded to the MOC. It can be used in communications with the MOC to identify requests. If no information is to be added, this can be left as a series of underscores ("_").
- vvvvv The sequence number of the MPRP for the particular instrument, padded with zeroes. For example, for the first MPRP from an instrument team, this value would be "00001". The sequence number is incremented per filetype (MCR_), source (VSO), destination (VMA), and per instrument/file type.
- VEX Always this value, for any MPRP that is relevant to the Venus Express mission.

Formatiert: Nummerierung und Aufzählungszeichen

23.3.3 File format

The file format shall follow the definition in AD02 (CRID).

Formatiert: Nummerierung und Aufzählungszeichen

23.3.4 Example

An example is given in AD02 (CRID).

Formatiert: Nummerierung und Aufzählungszeichen

23.4 Memory Dump Requests (MDRP)

23.4.1 Description

A memory dump of the on-board experiment software can be requested with the Memory Dump Request.

Formatiert: Nummerierung und Aufzählungszeichen

23.4.2 File naming convention

The file naming convention is the same as that for an MPRP (See section 23.3.2 above), with the type field *tttt* replaced by 'MDRP'.

Formatiert: Nummerierung und Aufzählungszeichen

23.4.3 File format

The file format shall follow the definition in AD02 (CRID).

Formatiert: Nummerierung und Aufzählungszeichen

23.4.4 Example

An example is given in AD02 (CRID).

Formatiert: Nummerierung und Aufzählungszeichen

23.5 Memory Checksum Requests (MCRP)

23.5.1 Description

Verifying the memory checksum can be requested using the Memory Checksum Request.

Formatiert: Nummerierung und Aufzählungszeichen

23.5.2 File naming convention

The file naming convention is the same as that for an MPRP (See section 23.3.2 above), with the type field *tttt* replaced by 'MCRP'.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

23.5.3 File format

Formatiert: Nummerierung und Aufzählungszeichen

The file format shall follow the definition in AD02 (CRID).

23.5.4 Example

Formatiert: Nummerierung und Aufzählungszeichen

An example is given in AD02 (CRID).

Formatiert: Nummerierung und Aufzählungszeichen

24 Receipt Acknowledgements

Upon upload of any file to the official SOC interface, an experimenter will be sent a receipt acknowledgement. These receipts will be automatically generated by a software called ORFA (Operations Request File Acknowledger).

24.1.1 ACKN File Format

Formatiert: Nummerierung und Aufzählungszeichen

An acknowledgement contains information on the handling of the file as it was uploaded to the SOC. Acknowledgement files are presented in XML format. A minute description of the XML fields is given in the DTD included in each acknowledgement, and is also listed in Appendix A.

The fields are as follows:

1. The date and time of the start of the handling by ORFA of the uploaded file. The elements *receive_date_utc* and *receive_time_utc* list this time in universal time, and *receive_date_system* and *receive_time_system* report the local system time. Be aware that the local system time is like to be set to UTC. The date will conform to a `yyyy-mm-dd` format, the time will be formatted as `hh:mm:ss`.
2. Information about the ORFA file handling software:
   - *version* the version of ORFA;
   - *host* the computer on which ORFA was running, usually the host that the planning file was uploaded to;
   - *pid* the process identification number of ORFA on the host machine;
   - *lognumber* a serial number that is unique to every upload, and can be used to trace the ORFA log messages that apply to that upload;
   - *ftp* information about the host that received the acknowledgement;
   - *receive_filename* the full path name of the file that was handled by ORFA;
   - *result* the result of the evaluation, this will be in the form of mnemonics as given in Table 12;
   - *error* the result is explained in this section, along with the severity of the result, good results are also explained here;
   - *test* an explanation of the content check that was applied to the uploaded planning file, left empty if no content check was done;
   - *log_message* all log messages that ORFA generated during the handling of the file (up to the generation of the acknowledgement).

All files that were successfully submitted to the SOC will generate an acknowledgement that has the “OK” entry in the *result* field. If otherwise, the instrument team will be able to determine what was wrong, rectify the problem and resubmit the planning file. In these cases the instrument team will immediately contact the SOC:

1. No acknowledgement is received within a reasonable time frame (~ 15 min).
2. The *result* field of the acknowledgement shows an error that can only be resolved by the SOC.
3. The instrument team does not know how to resolve the problem listed in the *result* field of the acknowledgement.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May
Formatiert: Nummerierung und Aufzählungszeichen

24.1.2 Example of an Acknowledgement

This Acknowledgement was generated in the course of several tests. The internal DTD has been omitted. Note that under error 03, content checking would not be done.

File name for example below: ACKN_VSOVV__D_ITL_____03_00019.VEX

Table 9: Example of an Acknowledgement

```
<?xml version="1.0" encoding="US-ASCII"?>
<!-- ORFA -->
<acknowledgement>
  <receive_date_utc>2005-05-10</receive_date_utc>
  <receive_time_utc>12:14:08</receive_time_utc>
  <receive_date_system>2005-05-10</receive_date_system>
  <receive_time_system>14:14:08</receive_time_system>
  <orfa>
    <version>1.6</version>
    <host>horizon</host>
    <pid>19028</pid>
    <lognumber>83</lognumber>
    <ftp>
      <destination_server>horizon.estec.esa.int</destination_server>
      <user>ahulsbos</user>
      <upload_directory>orfa_acknowledgements/</upload_directory>
      <transfer_attempts>1</transfer_attempts>
    </ftp>
    <receive_filename>VV_CP0006___0054_0060__A_VS0PI1.itl</receive_filename>
    <result>ERRSQNR</result>
    <error>
      <error_number>03</error_number>
      <error_string>Sequence number incorrect</error_string>
      <error_severity>error</error_severity>
    </error>
    <test>
      <version>EPS Version: v1.7</version>
      <output>
InputReader: Warning: No file type found for include file
OIOR_PI7RSO_D_0000_SR_PC____00026.ROS
   At top level file
   (Base directory: /var/orfa/tmp)
   Info: Assuming default file type ITL
EPS: Input file(s) successfully checked
     ITL|POR file: /var/orfa/tmp/OIOR_PI7RSO_D_0000_SR_PC____00026.ROS
      </output>
    </test>
    <log_message>
The submitted file
'VV_CP0006___0054_0060__A_VS0PI1.itl'
was checked and found incorrect:
Filename check found no errors.
PI update sequence incorrect (submitted: 1, last submission was: 1).
    </log_message>
  </orfa>
</acknowledgement>
```

Formatiert: Nummerierung und Aufzählungszeichen

24.1.3 File Names

The file names of acknowledgements will be constructed according to the following format:

```
123456789012345678901234567890123456 7
ACKN_VSOddd_D_tttt_vvvvv_ee_nnnnn.VEX
```

with

- `ACKN` The type of the file, always an acknowledgement.
- `VSO` The source of the file, a three letter mnemonic indicating the SOC.
- `ddd` The destination of the file, a three letter mnemonic, taken from the CRID Appendix C. See Table 8.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

Table 10: Acknowledgement Destination

Instrument	*Destination Mnemonic*
ASPERA	PVA
MAG	PVB
PFS	PVC
SPICAV	PVD
VERA	PVF
VIRTIS	PVE
VMC	PVG

- `tttt` The type of the submitted file.

Table 11: Acknowledgement Submitted File Type

File Type	*Indication*
Memory Checksum Request (PI-VSOC I/F)	MCRP
Memory Dump Request (PI-VSOC I/f)	MDRP
Memory Patch Request (PI-VSOC I/F)	MPRP
PIOR Modification Request	PMRQ
Input TimeLine	ITL
Pointing Timeline Request	PTR_

- `vvvvv` The version number of the uploaded file. This applies only to MCRP, MDRP and MPRP type files. For other files this field is filled in with 5 underscores.
- `ee` The error number of generated by the file checker. Not all errors need apply to the experimenter submitting the file (especially those marked with '*').

Table 12: Acknowledgement File Checker Error Number

Mnemonic	*Error Description*	*Number*
OK	No errors	00
ERRNAME	Error in file name	01
ERRCONT	Error in file contents	02
ERRSQNR	Error in file sequence number	03
ERRDBIN	* Database ingestion failed	04
ERRNMLN	Error in file name length	05
ERRNOFW	* File forwarding failed	06
ERRUSER	Error in user account	07

- `nnnnn` The sequence number of the acknowledgement, padded with zeroes.
- `VEX` The acknowledgement is relevant to the Venus Express mission.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

25 MOC Operational Queries

Formatiert: Nummerierung und Aufzählungszeichen

SOC may be charged with the task of responding, via iteration with the instrument teams, to operational queries generated by ESOC. On receipt of such queries, SOC staff shall first assess the query, in consultation with the Project Scientist, and determine which PIs need to be contacted. SOC shall then forward the query to the appropriate contact points.

26 Instrument Specific Information

Formatiert: Nummerierung und Aufzählungszeichen

Any instrument specific information which is either an addition to, or a deviation from, the SOC-PI Interface described in the rest of this ICD is documented here.

26.1 ASPERA

Formatiert: Nummerierung und Aufzählungszeichen

No instrument specific addition or deviation identified.

26.2 MAG

Formatiert: Nummerierung und Aufzählungszeichen

No instrument specific addition or deviation identified.

26.3 PFS

Formatiert: Nummerierung und Aufzählungszeichen

No instrument specific addition or deviation identified.

26.4 SPICAV/SOIR

Formatiert: Nummerierung und Aufzählungszeichen

When performing SOIR pointing, the inertial pointing shall be specified with the full body vector.

26.5 VeRa

Formatiert: Nummerierung und Aufzählungszeichen

The VeRa specific deviations from the standard SOC-PI interfaces are described in AD11, SOIA.

It should be noted that VeRa is an exception to the science operations window concept, because its operations will interrupt Earth downlink but VEX is still in Earth-pointing mode.

26.6 VIRTIS

Formatiert: Nummerierung und Aufzählungszeichen

No instrument specific addition or deviation identified.

26.7 VMC

Formatiert: Nummerierung und Aufzählungszeichen

No instrument specific addition or deviation identified.

27 Training

Formatiert: Nummerierung und Aufzählungszeichen

SOC is providing a number of services to the instrument teams for which they will require a certain amount of instruction. SOC shall provide adequate training to the PI teams in the use of these services through the provision of suitable manuals or by tutorial sessions as necessary. The SOC services include:

- The MAPPS tool
- The SOC command file structures
- The PIOR/PMRQ interface mechanisms

The SOC-PI interface mechanisms and command structures have been designed so as not to require sophisticated tools at the PI Institute. For example, a PMRQ can be produced from a PIOR using a standard text editor.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

The timing, content and location of training sessions shall be determined by negotiation between SOC and each team. SOC shall inform the instrument teams of all plans for training.

Formatiert: Nummerierung und Aufzählungszeichen

28 Revision of this Document

Changes may be requested by any party to this ICD. This document shall be maintained by SOC under configuration control. Proposals for change should be sent to the SOC address (vsoc@rssd.esa.int). SOC will assess the impact of the change in consultation with the Project Scientist and the proposal authors. When this assessment is complete and if the request is agreed, SOC will update the ICD and circulate the new version to PIs.

Formatiert: Überschrift 1

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

29 Appendix A: Acknowledgement DTD File

The information below is the DTD file for the acknowledgements discussed in Section 24.

```
<!-- ACKNOWLEDGEMENT.DTD
     ORFAlib - xml model for acknowledgement
     Date: May 9 2005
     Programmer: Arjan Hulsbosch (ahulsbos@rssd.esa.int)
     For: ESA - RSSD - Planetary
-->

<!ELEMENT acknowledgement ( receive_date_utc ,
                            receive_time_utc ,
                            receive_date_system ,
                            receive_time_system ,
                            orfa )>

<!ELEMENT receive_date_utc ( #PCDATA )>
<!ELEMENT receive_time_utc ( #PCDATA )>
<!ELEMENT receive_date_system ( #PCDATA )>
<!ELEMENT receive_time_system ( #PCDATA )>

<!ELEMENT orfa ( version ,
                 host ,
                 pid ,
                 lognumber? ,
                 ftp ,
                 receive_filename ,
                 result ,
                 error ,
                 test ,
                 log_message )>

<!ELEMENT version ( #PCDATA )>
<!ELEMENT host ( #PCDATA )>
<!ELEMENT pid ( #PCDATA )>
<!ELEMENT lognumber ( #PCDATA )>

<!ELEMENT ftp ( destination_server , user , upload_directory ,
                transfer_attempts )>
<!ELEMENT destination_server ( #PCDATA )>
<!ELEMENT user ( #PCDATA )>
<!ELEMENT upload_directory ( #PCDATA )>
<!ELEMENT transfer_attempts ( #PCDATA )>

<!ELEMENT receive_filename ( #PCDATA )>
<!ELEMENT result ( #PCDATA )>

<!ELEMENT error ( error_number , error_string , error_severity )>
<!ELEMENT error_number ( #PCDATA )>
<!ELEMENT error_string ( #PCDATA )>
<!ELEMENT error_severity ( #PCDATA )>

<!ELEMENT test ( version , output )>
<!-- <!ELEMENT version ( #PCDATA )> -->
<!ELEMENT output ( #PCDATA )>

<!ELEMENT log_message ( #PCDATA )>
```

Formatiert: Überschrift 1

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

30 Appendix B: File Summary

The following is a list of the files that are transferred between the SOC and the instrument teams.

Name	File Type	From	To	Xfr Mechanism
PIOR	ITL	SOC	PI	OFPM
PMRQ	ITL	PI	SOC	ORF-A
MTP	ITL	SOC	PI	OFPM
MTP	ITL	PI	SOC	ORF-A
IBAT	ITL	PI	SOC	E-Mail
ACKN	XML	SOC	PI	ORF-A
MPRP	VEX	PI	SOC	E-Mail
MDRP	VEX	PI	SOC	E-Mail
MCRP	VEX	PI	SOC	E-Mail

Gelöscht: RF-A
Gelöscht: RF-A

Formatiert: Überschrift 1

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

31 Appendix C – VEX_SO Directory

The VEX_SO directory is THE planning directory used by VSOC and is regularly distributed to the PI teams for planning purposes. The PI teams can use the same VEX_SO directory in the preparation of the planning files TO VSOC.

Formatiert: Textkörper
Gelöscht: Structure

31.1 „VEX_SO updates and delivery

Gelöscht: , Files and Use of MAPPS¶

Gelöscht: The use of the MAPPS tool is critical to the production and delivery of the science operations files. This section attempts to provide the instrument teams with information about how to load and use the information provided by the VSOC team related to MAPPS. ¶
If your specific questions or problems are not addressed by this information, please notify the VSOC engineers and the information can be included here in future deliveries.

In 2007 all PI teams have been provided direct access to the CVS VEX_SO planning files. All teams except MAG and ASPERA (who claim they don't need it for their planning) have confirmed that they have a working CVS connection to VEX_SO.

Therefore the direct CVS VEX_SO connection will replace the previously used VEX_SO delivery via Livelink.

VSOC will send out an email notification every time the planning files are frozen and ready for use by the PI teams before the MTP planning meetings. VSOC "tags" the frozen VEX_SO files and this allows the PI teams to "update" the frozen VEX_SO files at all times (also if meanwhile VSOC made internal modifications to proceed with the planning). After reception of the notification PI teams have to make a CVS "Update Special" which will "Update" the files with the specific tag. When VSOC sends out the email notification it will also specify with which name these files are tagged.

The naming convention for the CVS tags is linked to the MTP meetings:

- MTPXXX_Science_Preparation

- MTPXXX_Kick-off

- MTPXXX_Consolidated_PTR

- MTPXXX_ITL_evaluation

In order to make a CVS "Update Special" with a tag follow this procedure:

- right-click in the top-level VEX_SO directory (see figure 31-1)

- select "CVS" / "Update Special". You will get the menu in figure 31-2

- in the menu enable "get tag/branch/revision"

- type in the CVS TAG (provide by VSOC) or first press the "Update list" button and then select the TAG from the drop-down list

- Select "OK" to "Update" all the VEX_SO file with that specific tag

Formatiert: Nummerierung und Aufzählungszeichen

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

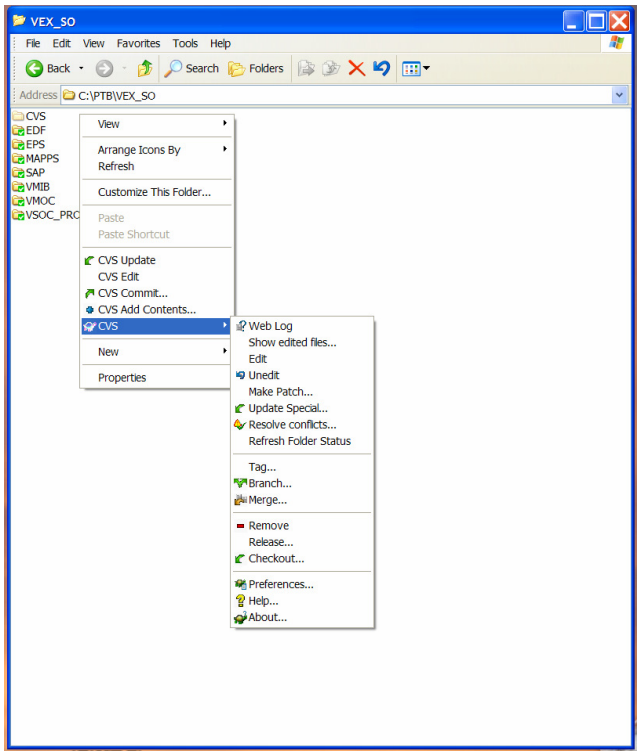

Figure 31-1 View after right-clicking in VEX_SO directory with Tortoise CVS

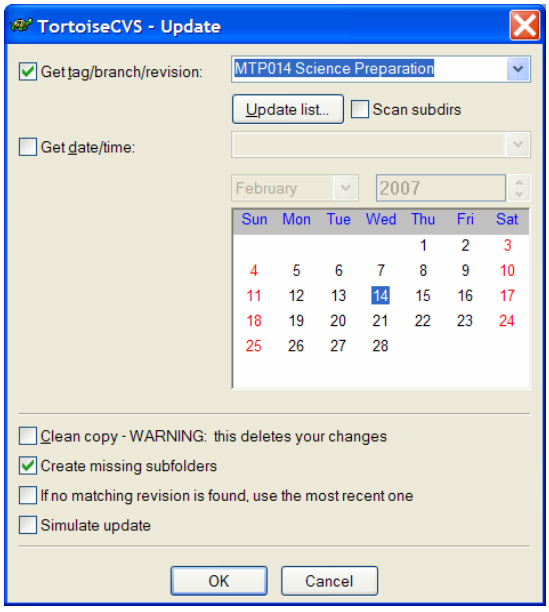

Figure 31-2 The Update Special Menu ready to Update the files with TAG “MTP014 Science Prepartion”

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

31.2 VEX_SO Directory Structure

Formatiert: Überschrift 2, Keine Aufzählungen oder Nummerierungen

The VEX_SO directory is structured in a way that fits the MTP planning process. Again, keep in mind that in the MTP planning process both the LTP and MTP planning files are used! In figure A-1 an overview of the VEX_SO directory is provided.

VEX_SO\EDF – Location of the Experiment Description Files (EDF) that are used to model the experiments (see chapter 14)

Formatiert: Schriftart: Fett
Formatiert: Schriftart: Nicht Fett

VEX_SO\MAPPS – Location of the MAPPS configuration files (see chapter 12)

VEX_SO\SAP\LTP\MTPxxx - The Long Term Planning files for an MTP are grouped together in a subdirectory named after the MTP, under the **LTP** directory. For example, MTP003 Long Term Planning files are located in *C:\PTB\VEX_SO\SAP\LTP\MTP003*. LTP files that have been resolved and processed into the MTP file format are located in *VEX_SO\SAP\MTP\MTP003. Note that*

Formatiert: Schriftart: Fett

1. The two top-level long term planning files for MTPxxx are in this directory
   - PL_MTPxxx_MTPxxx_PTR_OPS01A.ptr
   - PL_MTPxxx_MTPxxx_ITL_OPS01A.itl
2. Specific Long Term Planning (LTP) PTR and ITL files for MTPxxx that are unique to one orbit are in this directory

Formatiert: Nummerierung und Aufzählungszeichen

See section 16.4 and 16.5 for more information on the LTP PTR and ITL files

VEX_SO\SAP\MTP\MTPxxx – The Medium Term Planning files for an MTP grouped together in a subdirectory named after the MTP, under the **MTP** directory. Please note that these files have been resolved and processed into the MTP file format based on the LTP files for the MTP. After the LTP processing, the MTP files now have a duration of 4 weeks and are ordered per experiment. These ITL files are pushed to the PI team machines over the official interface. Some PI teams (ASPERA, MAG and VeRA) use these MTP files for making the iteration with VSOC using the official interface.

Formatiert: Schriftart: Fett

See section 16.6 for more information on the MTP PTR and ITL files.

VEX_SO\SAP\STP\MTPxxx - The Medium Term Planning files for an MTP grouped together in a subdirectory named after the MTP, under the **STP** directory. These files are **not** required by the PI teams in the MTP planning process. The STP (PIOR/PMRQ) system goes via the official interface between PI teams and VSOC and all files are automatically injected into the VEX_SO\SAP\STP\MTPxxx directory.

See section 17 for more information on the LTP PTR and ITL files

VEX_SO\SAP\OBS_LIB - The Generic files (containing "GEN" in the file name) are in the Operational Library (OBS_LIB). The OBS_LIB consists of both PTR and ITL files which have been validated. These files are used for (1) making the initial baseline for an MTP and for (2) real re-use in the MTPs

See section 14 for more information on the OBS_LIB files

VEX_SO\SAP\VMOC - Files provided by the VMOC Flight Control Team (FCT) like the Ground Stations Schedule (FECS file) and the Bit-Rate File (BRF) are located in *VEX_SO\VMOC\FCT*. Those files provided by the Flight Dynamics team or based upon those files are located in *C:\PTB\VEX_SO\VMOC\FD*. In addition the Medium Term Event file generate by the VSOC software based on the MTP PTR is stored in this directory.

See section 12.3 for more information on the VMOC files

See section 16.7 for more information on the VSOC generated Event File.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May
Formatiert: Nummerierung und Aufzählungszeichen
Formatiert: Textkörper
Formatiert: Englisch (USA)
Formatiert: Überschrift 3
Formatiert: Nummerierung und Aufzählungszeichen

31.3 Files to be ignored within VEX_SO

Within the VEX_SO directory there are some files that can be ignored by the PI teams as they are for VSOC usage only.

31.3.1 ReadMe File

In many directories is a file called

AA_README.TXT

which records which files go with which MTP's, and any other information of use to people looking into the directory for the first time. If additional information would be useful, please notify VSOC.

Formatiert: Überschrift 3
Formatiert: Nummerierung und Aufzählungszeichen

31.3.2 Batch Files

The batch files (*.bat) are only used by the VSOC team, to process the files on the EPS.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

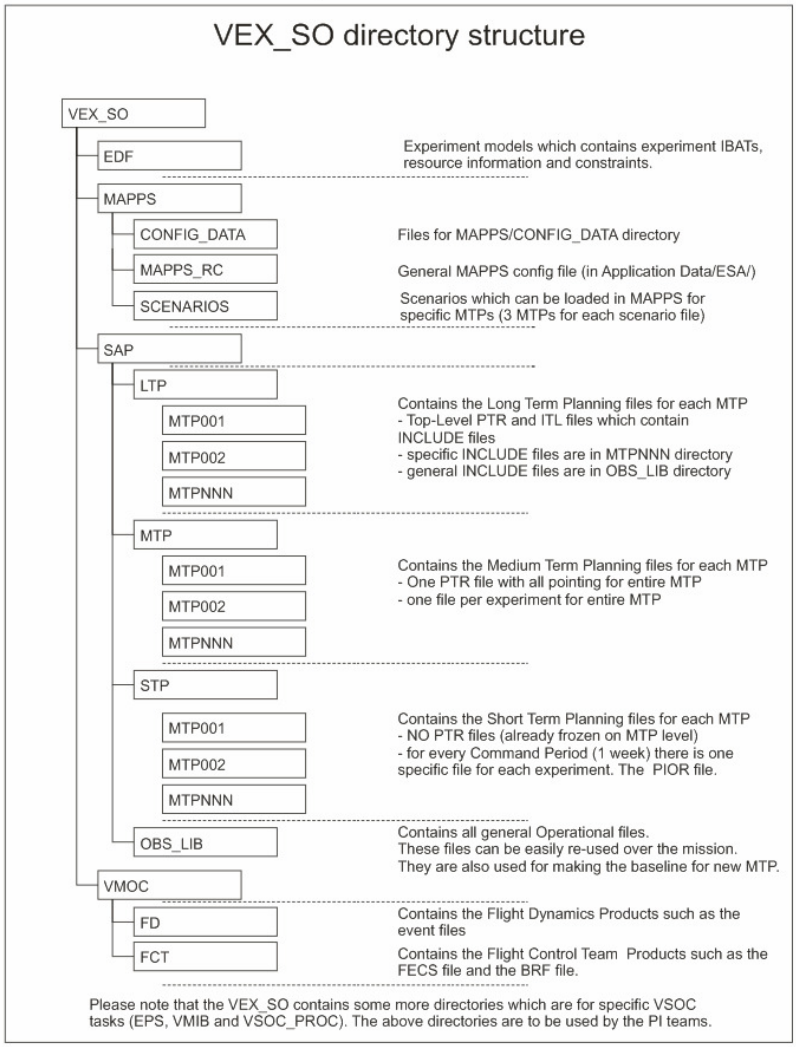

Figure 8: VEX_SO Directory Structure Overview

Formatiert: Beschriftung, Zentriert

Gelöscht: Orbit definiti... [26]

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

32 Appendix D: Loading Files in MAPPS

The use of the MAPPS tool is critical to the production and delivery of the science operations files. This section attempts to provide the instrument teams with information about how to load and use the information provided by the VSOC team related to M APPS.

The information below shows how to load the consolidated PTR and ITL files which are in the VEX_SO\SAP\MTP directory. For the early planning which is done in the LTP directory, substitute the directory VEX_SO\SAP\LTP, and load the high-level PTR and ITL files whose file names begin with "PL_MTPxxx___MTPxxx___".

If your specific questions or problems are not addressed by this information, please notify the VSOC engineers and the information can be included here in future deliveries.

32.1 Starting MAPPS

Gelöscht: As of Version 6.1, MAPPS can now read in the LTP ITL and PTR files, and how to load them is outlined below. ¶
Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

The process provided to you by Raymond Hoofs should have gotten you to the point where you have an icon on your computer desktop for the Mapping and Planning Payload Science (MAPPS) software.

1) Double click the MAPPS icon. If error messages appear, please read what the error is. If you are not concerned about the particular error you receive, then you can ignore it by clicking on OK. If you are unsure, please contact VSOC.
2) After starting MAPPS, you should end up with two windows open: the MAPPS window that (by default) has a map of Venus, and a MAPPS Control Panel window.

32.2 Load the PTR File

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

In the MAPPS Control Panel window, click on the "Input Data" tab. This will then contain sub-tabs for Orbit Data, Attitude Data, Experiment Timeline, Timeline Events and Slew Options.

1) Select the "Attitude Data" tab.
2) The check box labelled "Include pointing requests from ITL data" should not be checked.
3) In the Attitude data source drop-down menu, choose "Use EPS PTR file" if this is not the default value.
4) In the "EPS PTR directory", type in the directory below if it is not already the default value:

   ..\..\..\VEX_SO\SAP\MTP\MTPxxx

5) In the "EPS PTR file" box, enter the name of the PTR file you received in the VEX_SO file delivery or click on "Select" and then click on the desired file:

   PL_MTPxxx___yyyy_zzzzPTR_OPS01A.ptr

   where yyyy and zzzz are the first and last orbit numbers of the MTPxxx. This may cause a loud noise, after which a window will appear that tells you that "Errors were found when initializing the EPS InputReader. View Details?". Click on OK to have a window pop up and display the errors it noted in the PTR file, then click on "Close" to get that depressing window out of your face. How you resolve these errors depends on what they are, and is too complicated for this document. Contact VSOC for assistance.

32.3 Load the ITL File

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

In the MAPPS Control Panel window, click on the "Input Data" tab. This will then contain sub-tabs for Orbit Data, Attitude Data, Experiment Timeline, Timeline Events and Slew Options.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

1) Select the "Experiment Timeline" tab.
2) The check box labelled “Include pointing requests from ITL data” should not be checked.
3) In the Timeline data source drop-down menu, choose “Use ITL sequences” if not the default value.
4) In the “ITL sequences directory”, type in the directory below if it is not already the default value:

   ..\..\..\VEX_SO\SAP\MTP\MTPxxx

5) In the “ITL sequences file” box, enter the name of the ITL file you received in the VEX_SO file delivery:

   PL_MTPxxx___yyy_zzzzMOD_OPS01A.itl

   where yyyy and zzzz are the first and last orbit numbers of the MTPxxx. This may cause a loud noise, after which a window will appear that tells you that “Errors were found when initializing the EPS InputReader. View Details?”. Click on OK to have a window pop up and display the errors it noted in the ITL file, then click on “Close” to close the window. How you resolve these errors depends on what they are, and is too complicated for this document. Contact VSOC for assistance.

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

32.4 Load the Event File

In the MAPPS Control Panel window, click on the “Input Data” tab. This will then contain sub-tabs for Orbit Data, Attitude Data, Experiment Timeline, Timeline Events and Slew Options.

1) Select the "Timeline Events" tab.
2) In the “Event input directory”, type in the directory below if it is not already the default value:

   ..\..\..\VEX_SO\VMOC\FD

3) In the “Event input file” box, enter the name of the event (*.evf) file you received in the VEX_SO file delivery or through separate delivery, such as:

   MISSION_event_file.evf

4) The check box labelled “resolve timeline events” should be checked.

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

32.5 Load the Ground Station Coverage (FECS) File

The FECS file specifies when we have ground station coverage and can downlink data. The file is specified in the event file and does not need to be loaded separately.

The file is shown in the MAPPS/Input Data/Orbit Data window, and can be loaded manually. This is not recommended. If errors in the FECS file are suspected, please contact VSOC.

Formatiert: Überschrift 2
Formatiert: Nummerierung und Aufzählungszeichen

32.6 Run MAPPS With The New Files

In the MAPPS Control Panel window, follow the steps above to load the correct files. Then click on the “Compute” button in the lower left corner of the window. Then enjoy a refreshing cup of tea or go for a healthy walk while MAPPS processes the files.

If you did not resolve the errors noted in the PTR and ITL files, then the files will not process and you will again receive an error message and the option of displaying the errors. If you cannot resolve the errors, please contact VSOC for assistance.

Gelöscht: 0

Gelöscht: 15

Gelöscht: May

32.7 Timeline Visualization

Formatiert: Nummerierung und Aufzählungszeichen

MAPPS contains a timeline visualization feature. This is extremely useful for science planning and will be used quite often.

Formatiert: Nummerierung und Aufzählungszeichen

32.7.1 Orbit Timeline Visualizations

To access the timeline visualization, you open the timeline visualization window by entering *control V* on the keyboard, or selecting *Windows/Timeline Visualization* from the MAPPS main window. This opens the Visualization control window. Clicking on the Timelines tab shows you the timelines for each orbit.

VSOC has created a MAPPS configuration file that contains standardized colors for the different elements in the visualization window. Having one standard choice of colors and lines allows people to communicate what they have on their screens more clearly with colleagues, via writing or voice. If you are not sure if your installation has the latest configuration file, contact VSOC.

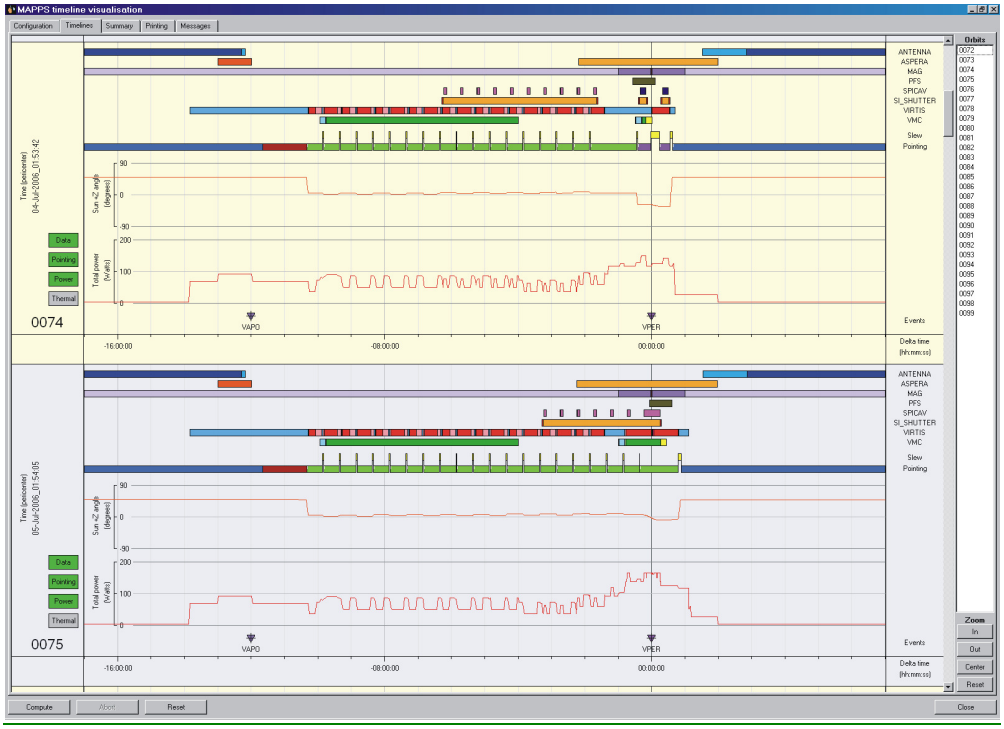

Figure 9: View of the Timeline Visualization window in MAPPS

Formatiert: Nummerierung und Aufzählungszeichen

32.7.2 Changing Timeline Visualization Settings

To change one of your color settings, use the spacecraft Z face exposure as an example. In the Visualization control panel,

1. click on the Configuration tab
2. Click on the Visualisation tab
3. In the list of Overlays on the left side, check the box for “Sun +Z angle”
4. In the Overlay Options box that appears for Sun +Z angle, set Scale type to “Define Manual Range”, enter a Minimum value of “-90” and a Maximum value of “90”. The Time Scale can remain on Delta Time, Orbit Center should remain At Pericenter, and the Display Options check box should be checked for Merge Overlays.

Gelöscht: 0
Gelöscht: 15
Gelöscht: May

5. Click on the black box to the right of “Sun +Z angle” in the Overlay box. In the color box that appears, choose the color Red, then click on OK.

Now, when you return to the Timelines by clicking on the Timelines tab at the top of the window, you will see the Sun +Z angle in red displayed for each orbit. If this value is above the value of zero, you know that there is no exposure of the –Z face. If the +Z angle is less than zero, then the –Z face is exposed.

Formatiert: Nummerierung und Aufzählungszeichen

32.7.3 Viewing Timeline Visualizations

Zoom controls are at the bottom right side of the Visualisations window. One can also zoom in on a particular feature using the ‘rubber band’ feature of the mouse. To expand a rectangular section of a window, use the mouse to place the cursor at one corner of the rectangular area you desire to expand. Then click and hold the left mouse button, and drag the mouse to the opposite side of the rectangular area you wish to view in more detail. When you release the left mouse button, magic happens. This mouse-controlled zooming can be repeated as often as desired to get to the level of desired detail. Clicking Reset on the bottom right corner will quickly return you to the default magnification level, or you can use the Zoom buttons.

Formatiert: Nummerierung und Aufzählungszeichen

32.7.4 Printing Orbit Visualizations

In the visualization control window, select the Printing tab at the very top of the window. You can select how many orbits to place on each printed page, and initiate the print process. The nominal setting is to place 7 orbits per A4 portrait page, resulting in four pages of output.

Formatiert: Nummerierung und Aufzählungszeichen

32.7.5 Summary Statistics

By clicking on the Summary tab at the very top of the visualization window, you access the Summary Table. The information for each orbit includes the times of the various pointing modes, how much data your instrument will take, and how much will be in the SSMM.

Formatiert: Nummerierung und Aufzählungszeichen

32.7.6 Error Reporting

When MAPPS is run, errors for ITL’s are reported. The error report comes from EPS which runs inside MAPPS. However, this error reporting at the MAPPS level lacks essential details on the error (line number where it occurred in the file, for example). VSOC hopes to upgrade MAPPS in the future to better report the details of the error sources, which will require changes in the MAPPS software.

Seite 32: [1] Formatiert	**Hoofs**	**16.06.2006 10:44:00**

Schriftart: (Standard) Courier New, Fett, Kursiv, Englisch (USA)

Seite 32: [2] Formatiert	**Hoofs**	**16.06.2006 10:38:00**

Schriftart: (Standard) Courier New, Englisch (USA)

Seite 32: [3] Formatiert	**Hoofs**	**16.06.2006 10:38:00**

Schriftart: (Standard) Courier New

Seite 32: [4] Formatiert	**Hoofs**	**16.06.2006 10:40:00**

Schriftart: Fett, Französisch (Frankreich)

Seite 32: [5] Formatiert	**Hoofs**	**16.06.2006 10:41:00**

Schriftart: (Standard) Courier New

Seite 32: [6] Formatiert	**Hoofs**	**16.06.2006 10:42:00**

Abstand Nach: 0 pt

Seite 32: [7] Formatiert	**Hoofs**	**16.06.2006 15:38:00**

Schriftart: (Standard) Courier New, Französisch (Frankreich)

Seite 32: [8] Formatiert	**Hoofs**	**16.06.2006 15:38:00**

Französisch (Frankreich)

Seite 32: [9] Formatiert	**Hoofs**	**16.06.2006 10:41:00**

Schriftart: (Standard) Courier New

Seite 32: [10] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Abstand Nach: 0 pt

Seite 32: [11] Formatiert	**Hoofs**	**16.06.2006 15:38:00**

Schriftart: (Standard) Courier New

Seite 32: [12] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New

Seite 32: [13] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New

Seite 32: [14] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New

Seite 32: [15] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: Fett, Kursiv

Seite 32: [16] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New, Fett, Kursiv

Seite 32: [17] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New

Seite 32: [18] Formatiert	**Hoofs**	**16.06.2006 10:43:00**

Schriftart: (Standard) Courier New

Seite 32: [19] Formatiert	**Hoofs**	**16.06.2006 15:38:00**

Schriftart: (Standard) Courier New

Seite 32: [20] Formatiert	**Hoofs**	**16.06.2006 10:46:00**

Abstand Nach: 0 pt

Seite 32: [21] Formatiert	**Hoofs**	**16.06.2006 10:46:00**

Schriftart: (Standard) Courier New, Italienisch (Italien)

Seite 32: [22] Formatiert	**Hoofs**	**16.06.2006 10:46:00**

Schriftart: (Standard) Courier New

Seite 39: [23] Gelöscht	**Hoofs**	**16.06.2006 11:28:00**

Nominal operations require that the production of command sequences be done months in advance of execution, be accurate and be done quickly. To meet these goals, the nominal mission command generation will be as simple as possible, and the process as fully automated as possible.

To meet the goal of automating the nominal process, each instrument is modeled in a series of files. The modeling is created in the SOC Commanding Database as a series of ASCII files in the Experiment Data File (EDF) format. This modeling pushes a lot of work to the early planning

phases of the mission, but makes the automation of the nominal mission possible. The models define the individual 'states' of each instrument, and the resources used in that state.

Once the instrument states are defined via the EDF files, the state transitions must be modeled. This is done in the Instrument Baseline Activity Transitions (IBAT) files. These files, created for each instrument and in ITL format, are used to specify in advance the telecommands (or telecommand sequences) used to move the instrument from one state to another. The IBAT files are explained in Section 13.7.

The preparation of these IBAT files accurately models the instrument allowable states, and the methods of changing states. During nominal operations, the instruments can be commanded by creating the TLIS file. This file will list times relative to key events, the instrument mode change desired at that time, and the command sequences to accomplish the mode change. This ITL is explained in the nominal mission operations in Section 15.2.

Before launch, SOC shall collect and record the information required for it to construct an entry to the SOC Commanding Database for every instrument activity required by the SAP relevant to that plan. The initial set of this information shall be created by SOC using submissions from the PI teams and information on nominal operations extracted from the Operations Rules and Constraints Document (AD05) and the instrument FUMs (AD10). This information shall be supplemented after discussions with PI teams and ESOC. The information shall be converted to computer form by SOC and stored in tables within the SOC Commanding Database, the contents of which can be viewed, and dumped in ASCII, by the instrument teams using VSOCweb.

To ensure reliable processing by SOC software, it is mandatory for instrument team database inputs to conform to the formats described this document. Inputs that do not follow these standards would require additional manual intervention and processing at SOC and might require further interaction with the instrument team, so their overall processing may be delayed. In order to facilitate the submission of such input from instrument teams, an ASCII dump that conforms to these formats of the database structure can be copied from VSOCweb and pasted into an editor. This can be used by the instrument teams as the basis for changes or complete new submissions.

As input to this phase, the MOC Flight Dynamics team provides to SOC and the instrument teams the following files 6 months before the start of the planned operations:

LTOF – the long-term orbit file
LTEF – the long-term events file
The Star Occultation Event File
TMSS – The Trajectory Manoeuvre Slot Schedule
FDS SOC Constants File (FSC)

The TMSS contains slots required by FD for orbit control (pericentre height control, phase control, etc.).

The formal delivery of these files by FD shall take place at least 6 months prior to the start of the actual operations for the planned period. With these inputs, the SOC will work with the members of the SOWG whose instruments are involved in the schedule. The SOC and SOWG members perform a trade-off between science observations and communications.

Note that for VEX, FD no longer provides the Flight Events and Communications Skeleton (FECS), which contained station schedules and windows to perform WOL and OCMs. This task has been taken over by MPS, but the FECS now contains only the station schedule. The scheduling of the windows for reaction wheel offloading (WOL) is left to the SOC, which has to follow the rules stated in the SOIA App. D. The scheduling of windows for OCMs is done by FD and specified in the TMSS.

The FDS SOC Constants File contains constants to be used by the SOC at different phases of the mission planning to compute attitude slew durations, define custom attitude profiles, etc. The FSC will be delivered when new constants are required, or existing constants must be updated. It is expected that an update of the FSC will only exceptionally be required. See AD04 for more details.

OBS LIB ITLs and PTRs

Description

The Observation Library (OBS Lib) will consist of Input Timeline (ITL) files that contain operational sequences, and PTR files that contain associated pointing information. When it is desired to perform an operation, the developer can invoke the needed sequences by using an Include statement in the higher-level ITL or PTR file. The files are located at VEX_SO\SAP\OBS_LIB.

The Pointing Request (PTR) files describe the pointing requests to the spacecraft. They are written in the PTR file format. The file content and format is described in RD 03.

The Input Timeline (ITL) files list the time-tagged telecommand sequences of the experiments. It can also be used down to mode level, but only for long-term planning purposes. The files are written in the ITL file format, which is described in RD04.

OBS Lib File Naming Convention

For the OBS LIB ITLs and PTRs, the File Name Format is:

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.EXT`

where

EX = Experiment Identifier, or PL if file is for all experiments
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = (1) MOD (Mode level ITL) or (2) PTR (Pointing Request File)
IDD = GEN (for generic) for all files in the Observation Library
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version
EXT = ITL or PTR

Examples: `AS_CASE_ALL_ASPERA___MOD_GEN01A.itl`
`PL_CASE_1___PERICENT_PTR_GEN01A.ptr`

`EX_XXXXXXXX_YYYYYYYY_ZZZ_IDNNNA.itl`

OBS Lib File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

The PTR file formats used by VEX are *Nadir* and *Inertial*, which are discussed in Ref 03, PTR Software Specification.

OBS Lib File Validation

The files will be validated through the use of the EPS software.

LTP ITL Files

These files are located in the directory VEX_SO\SAP\LTP\MTPxxx where xxx is the three digit MTP number.

LTP ITL Files For The Complete Payload

For an LTP file, there is a top-level file which is used for all the experiments. The content primarily consists of 'include' statements which read in the ITL content for the individual experiments, either generic files from the OBS Lib or orbit-specific files.

Format: EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.itl

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
YYYYYYYY = MTPxxx (where xxx is the MTP number with leading zeroes)
ZZZ = ITL

IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples: `PL_MTP003____MTP003___ITL_OPS01A.itl`

For Individual Experiments:

The top-level file for an LTP consists primarily of 'include' statements which read in the ITL content for the individual experiments. The files for the individual experiments are named as shown in this section.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_NNNNNA.itl`

where

EX = the two letter abbreviation for the experiment (see Section 1.2)
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = MOD or SEQ (for VeRa ITL files only)
NNNNN = the identifier of the orbit for which this file is written, in the form 'OR' for orbit, followed by a three digit orbit number with leading zeroes.
A = the minor modification identifier of the high-level version

Examples:
`TV_CASE_8___TV_OCC___SEQ_OR089A.itl`
`VR_CASE_7___LIMB_____MOD_OR073A.itl`

LTP ITL File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

LTP ITL File Validation

The files will be validated through the use of the EPS software.

LTP PTR Files

These files are located in the directory VEX_SO\SAP\LTP\MTPxxx where xxx is the three digit MTP number.

LTP PTR Files For Complete Payload

For an LTP file, there is a top-level file which is used for all the experiments. The content primarily consists of 'include' statements which read in the PTR content for the individual experiments, either generic files from the OBS Lib or orbit-specific files.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_IDDNNA.ptr`

where

EX = PL when file is for all experiments
XXXXXXXX = MTPxxx (where xxx is the MTP number with leading zeroes)
YYYYYYYY = MTPxxx (where xxx is the MTP number with leading zeroes)
ZZZ = PTR
IDD = OPS
NN = the high-level version number, typically '01'
A = the minor modification identifier of the high-level version

Examples:
`PL_MTP003____MTP003___PTR_OPS01A.ptr`
`PL_MTP004____MTP004___PTR_OPS01A.ptr`

LTP PTR Files For Individual Experiments or Special Orbits

The top-level file for an LTP consists primarily of 'include' statements which read in the PTR content for the individual experiments. The files for the individual experiments are named as shown in this section.

Format: `EX_XXXXXXXX_YYYYYYYY_ZZZ_NNNNNA.ptr`

where

EX = the two letter abbreviation for the experiment (see Section 1.2) if only one is involved (such as TV), or PL if the special pointing is for multiple experiments on a particular orbit.
XXXXXXXX = Description 1 (for example: science case)
YYYYYYYY = Description 2 (for example: pericentre)
ZZZ = PTR
NNNNN = the identifier of the orbit for which this file is written, in the form 'OR' for orbit, followed by a three digit orbit number with leading zeroes.
A = the minor modification identifier of the high-level version

Examples: `TV_CASE_8___TV_OCC___PTR_OR087A.ptr`
`PL_CASE_5___HR1879___PTR_OR076A.ptr`

LTP PTR File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

LTP PTR File Validation

The files will be validated through the use of the EPS software.

SOC Commanding Database (EDF) Files

Description:

The instruments are modelled in the SOC Commanding Database in a series of EDF-formatted files. Some of these EDF files are extracted from the operational database (VMIB) delivered to the SOC by the MOC (experiment commands and telecommands), and some are created by the SOC as part of the long term planning (IBATs, instrument modeling).

EDF File Naming Convention

The EDF files for each experiment reside in a specific structure. The highest level file is called

<experiment>.edf	highest level file, containing high level operational data (FOV, modes, power and data rates for modes, etc)

where <experiment> is one of the seven experiment name strings shown in Table 1.

The other files are brought into the high level file via 'include' statements. The files and their content are:

< experiment >_ibats.edf	Contains the IBATs specified by the PI Teams
< experiment >_seqs.edf	Contains the telecommand sequences, or CSEQs, automatically extracted from the VMIB.
< experiment >_cmds.edf	Contains the experiment commands
< experiment >_model.edf	Contains detailed models of power and data rate, and instrument-specific scientific and operational constraints

EDF File Configuration Control

These files will be configuration controlled with unique filenames by CVS.

EDF File Format

Detailed information on the EDF file format is in RD04.

EDF File Validation

The SOC VMIB contents are automatically used to generate the initial EDF files. Manual updates are later made to the files for required additional information. The EDF files are validated by manual inspection – by SOC staff and by PI teams. Validation is also performed through extensive use of the files by EPS.

CSEQs

Description

The initial process of definition of command sequences (or CSEQs), in terms of the telecommands and parameters they contain, is an activity carried out between the PIs and ESOC, with SOC taking an active interest in this process. During this process the PIs may define default values for certain CSEQ parameters which will be held in the MOC VMIB.

CSEQ Naming Convention

The CSEQ naming convention is defined in AD11. As stated there, CSEQs are identified within the MOC database by an 8-character ID "`AxxYnnnZ`" and these will be the names used by SOC in constructing PORs. The CSEQ names are derived from either flight control or contingency recovery procedures as contained in the FOP.

These fields are defined as:

Table 8: CSEQ Naming Convention

Field	Value
A	Every CSEQ starts with 'A'
xx	2 digit instrument ID, see following Table
Y	F – Flight Control Procedure C – Contingency Recovery Procedure S - Sequence
nnn	Reference to procedure specific operations
Z	Number of sequence in a procedure (from A-Z)

The last 2 digits of the sequence long name identify the version of the sequence. E.g.:

CSEQ ID	CSEQ Long name
AVVF003A	Configure VMC for Science v04

The above example identifies the CSEQ derived from the first sequence of TCs in procedure VV-FCP-003 which is in its fourth version.

The two character abbreviations of the instrument names are shown in Section 1.2.

CSEQ Configuration Control

The CSEQs are part of the VMIB, whose configuration control is a MOC responsibility.

CSEQ Format

All CSEQs used in IBATs must be defined in the Venus Express Mission Information Base (VMIB) as valid instrument Flight Control Procedures (FCPs) by ESOC. The CSEQ names in the IBAT will be the CSEQ Short Name.

CSEQ Validation

The scope of CSEQ updates and the procedure for making such updates (including new CSEQs) are formally specified in the ORCD. During mission operations SOC will play an active role in this process by raising the Document Change Request for consideration by the MOC Change Review Board. Thus PI requests for changes must be sent to SOC in the form of changes to the FOP procedure from which the affected CSEQ is generated.

The changing of a default parameter value is considered to be an update to a CSEQ definition and will follow the same procedure.

SOC will maintain synchronisation with ESOC of its copy of the instrument CSEQ in the command database. This is done by the regular ingestion of database exports from the VMIB, as specified in the change procedure, and the execution of a SOC internal procedure to detect inconsistencies between the export and the SOC database.

Where the change results in a change of CSEQ version number (as indicated by the last character of the CSEQ name), the change procedure requires the PI to advise SOC of the future orbit from which the updated CSEQ is to be used. The PI may then use the updated CSEQ in PMRQs that update instrument commanding from that orbit onwards. If the old CSEQ is used in any IBATs, the PI shall submit an IBAT change request to SOC to update those IBATs to use the updated CSEQ. SOC will advise when those updated IBATs can be used in generation of initial PIORs.

IBAT File

Description:

In order to automate the transition from TLIS to PIOR, the IBATs need to be defined. An Instrument Baseline Activity Transition (IBAT) File is a time-ordered sequence of calls to command sequences (CSEQs**),** which command an instrument activity or mode change. IBATS can have parameters and the parameter defaults are specified within the IBAT.

IBAT definitions are created by the PI teams, with the advice and assistance of the SOC. The IBAT must specify which TC sequences should be called in order to complete the desired instrument mode transitions or activities.

For instruments which have flown on previous missions, the PI teams may be able to create the IBAT files simply by updating the previous mission's IBAT files. In particular, the TC sequence names may need to be updated for the current mission.

For new instruments, the PI teams will need to define new IBATs.

IBAT File Naming Convention

The IBAT file is a text file in EDF format, which contains one or more IBATs. IBAT files follow EDF file naming conventions.

The name of the IBAT files is:

<experiment>_ibat.edf

where <experiment> is one of the instrument name strings (not the abbreviation) shown in Table 1. For example,

spicav_ibat.edf

Individual IBAT Naming Convention

The PI teams and SOC shall together assign a name to each IBAT; it shall be a lower case text string up to 18 characters in length, where the first three characters must be "`in_`" where "`in`" is the two character instrument mnemonic according to Section 1.

The IBAT File is composed of one or more IBATs. Inside the IBAT File, the name of each IBAT is shown in the IBAT block under the heading 'Action'.

The file naming convention for the IBATs (inside the IBAT file) is:

- for mode changes:
  <instrument abbreviation>_<current mode>_<final mode>

- for high level activity, such as calibration or image sequence:

  <instrument abbreviation>_<activity> (note: no file name extension)

Note that there is no extension or prefix on the IBAT names.

IBAT Configuration Control

These files will be configuration controlled with unique filenames by CVS.

IBAT Format

The content in the individual IBATs is composed of three types of records:

CSEQ Name

Time-tags for each CSEQ as an offset from the start of the IBAT

the names of any parameters required by those CSEQ calls.

The CSEQ time-tags shall be expressed relative to the start time of the IBAT, so the first CSEQ will have a time tag of 00:00:00. The time between time-tags of successive command sequences in an IBAT must be greater than the sum of the delta times between the telecommands within the initial sequence. This is essential to prevent overlapping execution of command sequences.

The set of calls to command sequences shall finish with the dummy command sequence name END_IBAT. The time-tag of this dummy sequence shall indicate the latest time (relative to the start time of the IBAT) at which execution of the IBAT shall be complete. SOC shall use this time to check the relative timing of IBATs. If the command schedule requests overlapping execution of two IBATs for one instrument, the SOC software will issue a warning during preparation of the schedule for a Commanding Period and SOC staff shall revise the schedule.

Parameter names in the IBAT may be up to 16 characters in length and shall be specified in lower case. Parameters shall have values that specify the target activity. There are no special constraints on the names of these parameters.

IBATs and parameter value sets shall not contain conditional structures, i.e. once an IBAT and a parameter value set have been selected, all command sequences and parameter values in that IBAT and value set shall be copied into the draft instrument command schedule (PIOR version 1 for Commanding Period *n*).

In the input formats described below, unspecified bytes in each record are the ASCII white space character, hex 20. Tabs must **not** be used to aid formatting of the inputs.

IBAT File Example

IBAT files can be found and viewed in the directory C:\PTB\VEX_SO\EDF, and the names are <XX>_ibat.edf, where <XX> is the name string for the particular instruments as listed in Table 1.

Below is a portion of an example IBAT file, which can be used as a template.

IBAT Validation

The IBATs will be updated by an instrument team sending an ASCII text file containing an entire IBAT file as a complete re-submission. The SOC database checking/ingestion scripts require the input files to conform to the definitions provided. The easiest way for a instrument team to do this is to use the ASCII dump provided in VSOCweb as the starting point for any change. Similarly, new inputs during operations must also use the same format. The SOC scripts ingest the updates in the specified format, increasing the reliability of the update process.

The ASCII file should be sent to the SOC e-mail address as an e-mail attachment. The e-mail itself must contain any relevant supplementary information, the minimum of which is:

- The name of the instrument to which the database change applies. SOC will validate that it comes from the e-mail address specified in Section 7.
- The date and time of the request
- The database entity being changed: IBAT, or other
- The nature of the change – revision of an existing entity or creation of a new entity

SOC will acknowledge the receipt of such e-mails and will inform the PI when the database has been updated. The instrument team may then check the updated status using VSOCWeb. After validation, which may involve concurrence from ESOC, SOC shall revise the command schedule to take account of the requested changes, if necessary.

Medium Term Planning

Once the Level B SAP is written for the relevant mission phases, each month (4 weeks) will be broken down and planned in more detail. The SOWG, with policy co-ordinated by and technical support from SOC, will resolve spacecraft resource conflicts to prepare resource-harmonized 4-week segments of the MTP on schedule for SOC to supply pointing requests to MOC analysis of the proposed slews. The MTP segments that have been resource-harmonized by SOWG, and successfully passed the slew analysis of the MOC Flight Dynamics Team, will be placed on VSOCweb so PI teams can view the timeline of activities that will be used to create the command schedule for the agreed period. In extraordinary cases SOC may request MTP updates, via the Project Scientist, to clarify problems identified during preparation of the command schedule. The end of a Medium Term Planning exercise shall occur 4 weeks prior to the start of the actual operations.

An ITL file will be created for each SAP mission phase. Each of these SAP ITL files will then be expanded into an MTP ITL file, in which Include files can be expanded by removing Include statements and inserting the include file contents. This leaves the file containing the IBAT calls. Each MTP ITL file will have an associated MTP Pointing Timeline Request (PTR) file.

During the MTP Cycle, the SOC produces the Pointing Timeline Requests, which are sent to the Flight Dynamics Team (FDT) at the MOC and are available for download from VSOCweb. The PTR contains the definition of the required pointing strategies, covers a 4 week period and is delivered at least 4 weeks prior to the start of actual operations. The FDT checks the PTR, and upon successful verification FDT generates the Flight Dynamics Timeline (FTL). The FTL has the same contents as the PTR, but the relative times for pointing phases are changed to absolute times. FDT checks the feasibility of the PTR from the point of view of the spacecraft dynamics. If the pointing requests are feasible, FDT sends the FTL back to the SOC for information purposes.

The User Custom Attitude File (UCAF) contains the description of user profiles. Reference to such a file is provided in the PTR by means of the CUSTOM pointing-type blocks. If necessary, the UCAF is provided along with the PTR. The CUSTOM pointing requests of one PTR are specified in only one UCAF (different requests shall be gathered in a unique file). It is currently foreseen to implement radio science special pointing by this mechanism (Science Case #8). FDT will check the UCAF along with the PTR. See AD 04 for more details on the UCAF.

In order to process the PTR, FDT computes a medium term attitude file consistent with the pointing requests, which fixes the pointing strategy for the four weeks of operations.

The PTR, UCAF, FTL and medium term attitude predictions are delivered via SFTP.

If the pointing requests are not feasible, MOC provides feedback to the SOC for resolution with the PI teams.

At the end of this activity the on-board resource usage is fixed. The on-board resources which are relevant during this analysis are: Pointing, Power, OBDH Data Rate, Downlink Data Volume and TC Buffer Size (if appropriate).

During this SOC-MOC activity, SOC is also iterating with the PIs using the PIOR/PMRQ mechanism to enable the PIs to modify/refine their payload commanding resulting from the previous cycle.

The MTP schedule will be divided into Planning Periods, each of one week duration. These Planning Periods will have a one-to-one match with the Commanding Periods as used at MOC and SOC – once a given Planning Period section of the plan has reached the Commanding phase and instrument commanding interactions with the individual PI teams have commenced.

Orbit definition file	orbit_def_00009.orb
Orbit data file	orbit_data_00009.asc

If you do not have the latest versions, please download these files and copy them to

C:\PTB\MAPPS\DATA\VEX\SIMULATION_DATA

Now the file can be loaded into MAPPS as discussed below.

Also delivered by flight dynamics is the event file. These are modified by VSOC to contain payload-related events. The current file is always copied into the file shown below, so using that name should always give you the latest version:

Event File	MISSION_event_file.evf

How to load these files into MAPPS is discussed below.

During the PTR generation the MISSION_events_file should be used.

Once a PTR is available, a specific MTPxxx_events_file will be also available (containing LIMB_IN and LIMB_OUT events).

During the PTR development the results for the MTPxxx_event_file will be updated. VSOC will provide the updated MTPxxx_event_file as these become available along with the PTR file.

Experiments which do not schedule observations relative to the LIMB_IN and LIMB_OUT events (for example, MAG and ASPERA) can always use the MISSION_events_file for their scheduling.

Flight Control Team Files

The latest flight control team files are located in

C:\PTB\VEX_SO\VMOC\FCT\

Along with lots of files that are not the latest, are way out of date or are related to special operations.

Example files names are:

FECS file	FECS_VPAVSO_D_____00005.VEX
Bit rate file	BRF__VPAVSO_D_EPS_____00003.VEX