



***HERSCHEL***

*MPS Chain Validation  
Test Plan & Report*

Doc.No: HERSCHEL-HSC-DOC-0977

Issue: Issue 1.0

Date: 1<sup>st</sup> August 2008

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**HERSCHEL**

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**MPS CHAIN VALIDATION  
TEST PLAN & REPORT**

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**Document Reference: HERSCHEL-HSC-DOC-0977**

**Issue 1.0**

**1<sup>st</sup> August 2008**

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## **Change Record**

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## 1. Introduction

This document corresponds to the test plan & report document related to the Herschel Mission Planning Chain Validation tests planned to be performed by the Herschel Ground Segment.

Two MPS Chain validation tests are to be performed. The first shall correspond to preparation for the AVM Reference Mission Scenario Test while the second shall correspond to preparation for the FM Reference Mission Scenario test.

As at draft 0.9 of the document, a status report of progress in the current MPS Validation test is provided in chapter 4 as input to the HSGS Implementation Review that takes place in the May/June timeframe.

This document is written according to the requirements laid down in [AD 1] and [AD 3]. It describes the objectives, pre-requisites, requirements, outcomes and teams associated with the test.

**Note:** Further releases of this document shall include information related to the configuration that existed on the S/C, Instruments, EGSE etc when running each of the RMS tests.

### 1.1 Test Context

The validation of the Mission Planning System Chain will be performed for Herschel under the premise of the AVM & FM Reference Mission Scenario test preparation.

These tests utilise the same files, the same transfer mechanisms and effectively the same software that shall be used for the Spacecraft End to End Test preparation.

The Reference Mission Scenario tests are Alcatel specific tests that form part of the Spacecraft Integrated System Test (IST) programme. As such, they are governed by the contents of [AD 3] and [AD 4]. Only a selected part of those documents shall be referred to in this test plan/report.

## 1.2 Applicable Documents

The following applicable documents have been identified.

| AD | Document Title  | Reference                              |
|----|---|--|
| 1  | Herschel/Planck Ground Segment System Test Plan (GSSTP)                                 | PT-CMOC-MGT-PL-1201-OPS-ONV, Issue 2.0 |
| 2  | Herschel Science Ground Segment Integration & Test Plan                                 | HERSCHEL-HSC-DOC-0589, Issue 1.2       |
| 3  | Test Specification for Herschel instruments AVM & FM tests performed at satellite level | H-P-2-ASP-TS-1083, Issue 1.0           |
| 4  | Herschel Satellite IST specification  | H-P-2-ASP-SP-0939, Issue 3.0           |
| 5  | Reference Mission Scenario – Herschel/Planck Project                                    | SCI-PT / 12759, Issue 3,1              |

## 1.3 Reference Documents

The following reference documents have been identified.

| RD | Document Title                                      | Reference                             |
|----|---|---------------------------------------|
| 1  | Herschel Mission Planning Concept                   | PT-HMOC-OPS-TN-6601-OPS-OGH Issue 2.2 |
| 2  | Herschel Science Ground Segment System Data Flow TN | HSCDT-TN052                           |
|    |   |                                       |
|    |   |                                       |

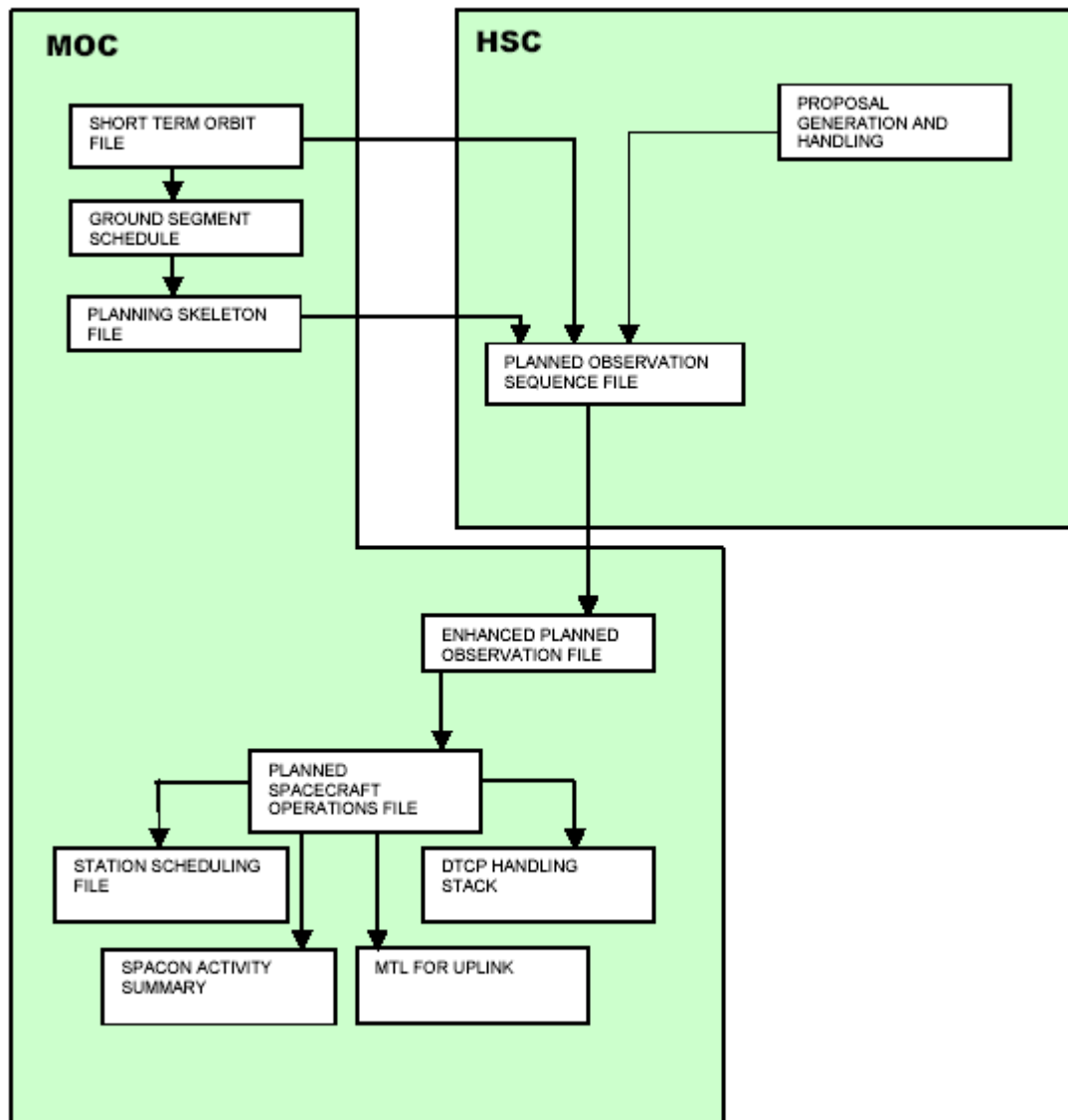
## 1.4 Acronym List – to be updated

|             |  |
|-------------|--|
| AO          | Announcement of Opportunity  |
| AOR         | Astronomical Observing Request                                     |
| AOT         | Astronomical Observing Template                                    |
| AR          | Anomaly Report   |
| CCB         | Configuration Control Board  |
| CSDT        | Common Science Development Team                                    |
| CUS         | Common Uplink System   |
| FIRST (ESA) | Far Infrared and Submillimetre Telescope (former name of Herschel) |
| GS          | Ground Segment   |
| HSCDT       | Herschel Science Centre Development Team                           |
| HCSS        | Herschel Common Science System                                     |
| HIFI        | (Herschel) Heterodyne Instrument for the Far Infrared              |
| HOTAC       | Herschel Observing Time Allocation Committee                       |
| HSC         | Herschel Science Centre  |
| HSCOM       | HSC Operations Manager   |
| HSCOT       | HSC Operations Team  |
| H/W         | Hardware   |
| MCS         | Mission Control System   |
| MOC         | Mission Operations Centre (located at ESOC)                        |
| MPS         | Mission Planning System  |
| OD          | Operational Day  |
| PACS        | (Herschel) Photodetector Array Camera and Spectrometer             |
| PHS         | Proposal Handling System   |
| PS          | Project Scientist  |
| PST         | Project Scientist Team   |
| RID         | Review Item Discrepancy  |
| S/C         | Spacecraft   |
| SGS         | Science Ground Segment   |
| SOV         | System Overall Verification (Test)                                 |
| SPIRE       | (Herschel) Spectral and Photometric Imaging Receiver               |
| SPR         | Software Problem Report  |
| SSO         | Solar System Objects   |
| S/W         | Software   |
| TBC         | To Be Confirmed  |
| TBD         | To Be Determined   |
| TC          | Telecommand  |
| TM          | Telemetry  |

## 2. Overview of the Mission Planning System Data Flow chain

### 2.1 System Data flow drawing related to the MPS Chain

RD 1 provides an overview of the data flow that is expected to take place in ground segment for the Mission Planning chain. The drawing below is extracted from that document:



From the perspective of breaking the above drawing into a more visible view of the workings of the full chain, the following data flows can be considered to be taking place [RD 1]:

#### (a) Ground Station Scheduling data flow

Flight Dynamics creates the Long Term Orbit file, which is then transferred to the Scheduling Office. The orbit information is taken by the scheduling office and merged with equivalent data from other missions based on agreed scheduling rules. The Scheduling Office creates the ESTRACK Schedule Allocation File (ESAF) containing the schedule of DTCPs, which is then passed to Flight Dynamics.

## **(b) MOC Flight Dynamics & HSC Data Flow**

Flight Dynamics incorporate the GSS information into the Planning Skeleton File (PSF). This file also contains windows for other spacecraft activities that impact on the science planning - for example windows for orbit manoeuvres that block out scientific pointings.

Both the short-term orbit file, the PSF and the proposals located in the HSC DB are then used by HSC to generate the planned observations for the next period. HSC produce the Planned Observation Sequence file (POS) that contains the data provided by the PSF, interspersed with instrument commanding and attitude requests.

The POS/ICPF pair is passed to MOC and processed by Flight Dynamics to expand attitude-related Event Designators (EDs) where necessary. Attitude / orbit related windows from the PSF are populated where appropriate. At this point the Reaction wheel momentum management commands will also be provided by FD.

The resulting files are the Enhanced Planned Observation Sequence file (EPOS) and Attitude Parameters File (APF) pair. In addition to the expanded attitude commands this file still contains the PSF information and instrument commanding contained in the POS.

## **(c) MOC Flight Dynamics & MOC MCS Mission Planning Data Flow**

The EPOS is passed to the Mission Planning System component of the MCS (Mission Control System) under the responsibility of the Flight Control Team. It is then processed by the MPS to translate both instrument and attitude EDs to commands or sequences.

The processing at this stage also includes instrument-level checks/processing, for example onboard SSMM storage predictions will be made. These checks provide a double check of the validity of the POS, and in the case of the SSMM predictions allow the duration of some DTCP activities (MTL load and later data dumps) to be estimated in advance.

EPOS processing results in the Planned Spacecraft Operations File (PSOF) and the Spacecraft Parameters File (SPF).

In the last stage the final products of mission planning system are generated from the PSOF/SPF file pair. These are

- The MTL for uplink
- The manual stack of non-MTL commands for DTCP handling.
- The spacon activity summary, which contains a list of, planned activities and timings for the pass. This summary is a script for on-line execution to provide event information messages during the DTCP, e.g. start/stop of real-time science, start/stop of packet store dumps.
- A station-scheduling file, which may be used for automated commanding of the ground station. This is a set of time tagged instructions that can be sent to the ground station computer for automated station operations.
- A ground station mission events file, which is passed back to the scheduling office.

Since multiple ODs are covered by a single mission planning cycle, multiple sets of these final products are created, one for each DTCP. In the nominal cycle seven sets of products are created.

---

**Important Note** : In the discussion of dataflow below only a single file is referred to at each stage, e.g. POS, EPOS, PSOF. In general these may be implemented as multiple files. For example it is usual ESOC practise to separate commands and command parameters into two associated files, e.g. EPOS + Attitude Parameters File (APF) etc. Moreover most flight dynamics products will be delivered as a separate file per OD i.e. a single nominal (weekly) PSF or EPOS delivery consists of seven separate PSF or EPOS files, one per OD. Ideally the POS would also follow this structure.

### **3. Test Approach & Test Details**

#### **3.1 Items/Features to be tested**

The following subsystems & procedures are to be tested in the two MPS Chain validation tests:

- MOC Flight Dynamics Orbit Prediction & Manoeuvre Design subsystem
- MOC Scheduling Office using the ESTRACK Planning System (EPS).
- MOC Flight Dynamics Mission Planning Subsystem
- MOC MCS Mission Planning Subsystem
- MOC Mission Control System TC subsystem
- HSC Proposal Handling Subsystem
- HSC Mission Planning Subsystem
- Operational Data transfer using FTS (File Transfer Mechanism)

### 3.2 Test interfaces & relevant Interface documentation

The following interfaces are to be tested in the MPS Chain Validation test as defined in [AD 1].

H01.A.HSC.MOC Herschel POS and ICP  
H01.J.MOC.HSC Herschel Long/short-term Orbit Events File  
H01.K.MOC.HSC Herschel PSF  
H01.S.MOC.HSC Herschel EPOS, APF and EPOS Summary (MTL Summary)  
H01.U.MOC.HSC Herschel Long/short-term Orbit data

M02.D.FDS.MCS OWLT  
M02.F.FDS.MCS H/P WIMPY  
M02.J.FDS.MCS H/P Long/short-term Orbit Events Files  
M02.K.FDS.MCS Herschel EPOS, APF and EPOS Summary

M07.A.SDS.FDS Herschel POS and ICPF  
M07.H.FDS.SDS Herschel EPOS, APF and EPOS Summary (MTL Summary)  
M07.J.FDS.SDS H/P Long/short-term Orbit Data Files  
M07.K.FDS.SDS Herschel PSF  
M07.L.FDS.SDS H/P Long/short-term Orbit Events Files

M18.A.FDS.SCH H/P Long-term Orbit Events File  
M18.B.SCH.FDS ESAF

The following interface documentation covers the interfaces mentioned above.

- CCSDS 502.0-B-1 CCSDS Orbit Data Messages
- DOPS-ESTR-OPS-TN-1001-OPS-ONF ESAF Definition
- HERSCHEL-HSC-ICD-0377 Herschel POS ICD
- PT-CMOC-FD-ICD-2101-OPS-GFI HP Orbit Data and Access Software ICD
- PT-CMOC-FD-ICD-2102-OPS-GFI HP OWLT ICD
- PT-CMOC-FD-ICD-2103-OPS-GFI HP Orbit Events File ICD
- PT-CMOC-FD-ICD-2104-OPS-GFT HP PSF ICD

### 3.3 Test Objectives & Requirements covered by the test

The following table outlines the main objectives to be validated/verified in the two MPS Chain Validation tests:

| Test Name            | Herschel Mission Planning Chain Validation Test  |
|----------------------|--|
| Test Objectives      | <p><b>To Validate:</b></p> <ul style="list-style-type: none"> <li>- The configuration and system-level interaction of the components involved.</li> <li>- The mission planning chain involving MOC, FDS and the science ground segment in exchange of all data products related to mission planning.</li> </ul> <p><b>To Verify:</b></p> <ul style="list-style-type: none"> <li>- The correct process in updating the Operational system at the HSC with data inputs provided by the ICCs and the MOC</li> <li>- The correct linking of the uplink &amp; downlink chains via the OBSID concept</li> <li>- The correct timing of events in performing the processing of data received from the ICCs and the MOC</li> <li>- The procedures relevant to the above interactions are correct</li> </ul> |
| Test Sites involved  | HSC, PACS/SPIRE/HIFI ICCs, MOC   |
| SGS Test Reference   | HGS-VT-SGS-SOV3.1  |
| GSSTP Test Reference | HGS-VT-MPS-1.0   |

The following requirements shall be validated in the course of running the MPS Chain Validation Test.

- FGS-IR-3.1-120 The MOC shall make available the spacecraft orbit predicted data to the HSC.
- FGS-IR-3.1-140 The HSC shall pull spacecraft predicted orbit data updates from the MOC.
- FGS-IR-3.1-210 The MOC shall make available to the HSC the planning skeleton information for any given scheduling period.
- FGS-IR-3.1-230 The HSC shall pull planning skeleton information from the MOC.
- FGS-IR-3.1-270 The MOC shall make available to the HSC the mission timeline summary corresponding to any given operational period.
- FGS-IR-3.1-290 The HSC shall pull the new mission timeline summary from MOC.
- FGS-IR-3.1-295 The MOC shall make available the mission timeline summary before the uplink of the corresponding mission timeline to the spacecraft.
- FGS-IR-3.1-350 The MOC shall make available the spacecraft reconstituted orbit data to the HSC.
- FGS-IR-3.1-370 The HSC shall pull spacecraft reconstituted orbit data from the MOC.
- FGS-IR-3.1-550 The MOC shall make available the orbit events corresponding to a given operational period.
- FGS-IR-3.1-570 The HSC shall pull the orbit event data from the MOC.
- FGS-IR-3.4-10 The HSC shall make available to the MOC the observations schedule corresponding to any given scheduling period.
- FGS-IR-3.4-30 An observations schedule made available to the MOC by the HSC shall be compatible with the spacecraft operational and design constraints.
- FGS-IR-3.4-50 The HSC shall push observations schedules to the MOC.
- MFUN-165 The MOC shall make available to the HSC (Herschel) and to the PSO and DPCs (Planck) the Mission Timeline summary corresponding to any given operational period after successful generation of the corresponding MTL(s).
- MFUN-170 The MOC shall generate in parallel to the Herschel and Planck MTL's the ground station (New Norcia) schedule corresponding to the same operational period.

### 3.4 Test Management

| Test Management     |                               |
|---------------------|-------------------------------|
| Test Responsibility | ESOC, HSC                     |
| Test Managers       | M. Schmidt & L. O'Rourke      |
| Test Support        | FCT, FDT and HSC team members |

### 3.5 Re-Testing and AR Closure

The MPS Chain validation test #2 i.e. preparation for the FM RMS test, shall include a specific set of tests required to close out Anomaly Reports raised during the first test.

### 3.6 Test Pass/Fail Criteria

Each subsystem to be used in this test shall be expected to comply with the requirements and objectives set down for this test.

### 3.7 Test Suspension Criteria and Requirements to Resume

Not applicable

### 3.8 Schedule

The schedule of the MPS Chain Validation tests is driven by the need to have the mission timeline provided to Alcatel for the AVM & FM RMS tests.

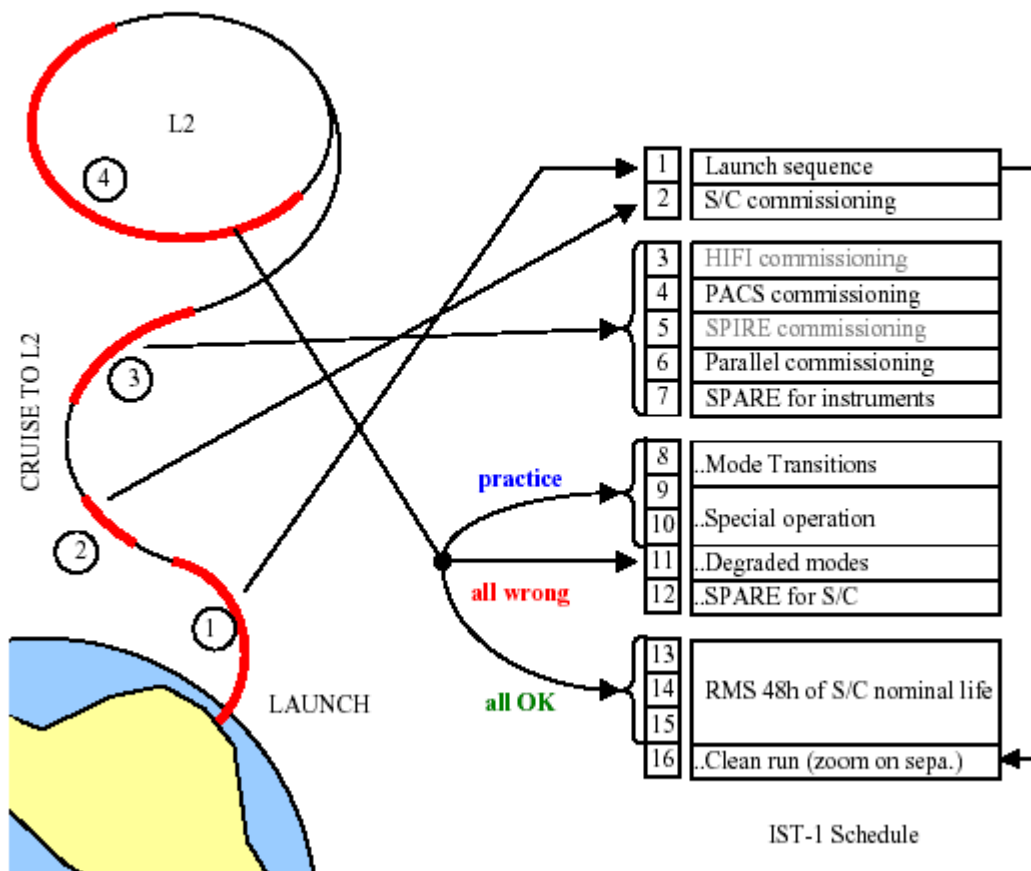
Schedule aspects are dealt with in the regular RMS progress telecons that are held between MOC, HSC, ICCs, Alcatel & Astrium.

### 3.9 The AVM & FM Reference Mission Scenario (RMS) Tests - background

The AVM & FM RMS tests form part of the overall Integration System Test programme. The Integrated System test is a satellite level verification, aimed to verify in an accelerated manner the main satellite functions that will be used during launch, commissioning, and operation. The IST will be performed 2 times: before (IST1) and after (IST2) the satellite environment tests.

A short summary of the IST is given here. For more details, refer to [AD 3 & AD 4]

The complete IST sequence is summarized on the following figure:



The objective of the **Reference Mission Scenario** is to test the satellite during its nominal long-term operation, especially comprising the scientific instruments operations. It is organised around the Reference Mission Scenario [AD 5], which defines the activities to be carried out during a typical operational day.

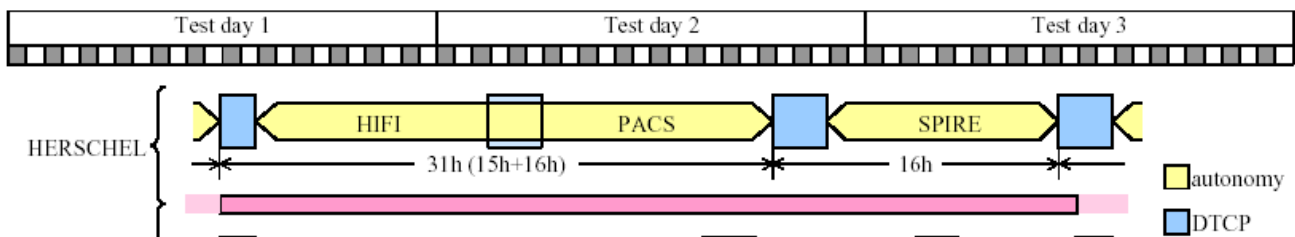
It will be a 48h continuous operation, controlled by mission timeline (MTL=time tagged sequences). Each instrument will be allocated 14h-simulated observation, separated by Slots of 3h DTCP simulation (Daily Tele-Communication Phase, including coolers recycling)). Inside this phase, instruments are free to prepare sequence using various observation modes.

The original concept of the AVM RMS test was to allow the Mission Timeline to be debugged using the AVM units of the instruments. This debugging would then result in a formal run being made on the FM instruments.

The RMS test flow based upon this concept was defined in issue 1.0 of [AD 3] to be that PACS will be used shortly at the beginning, in burst mode to fill the system memory for DTCP1. Then the sequence is the following.

- PACS Prime / Burst Mode (30mn)
- DTCP1: Switch PACS to HIFI (3h)
- HIFI Prime (include peak-up) (14h)
- DTCP2 : Switch HIFI to PACS + PACS cooler recycle (3h)
- PACS Prime (14h)
- DTCP3 : Switch PACS to SPIRE + SPIRE cooler recycle (3h)
- SPIRE Prime (include peak-up) (14h)
- DTCP4 : Switch SPIRE to HIFI cooler recycle (3h)
- HIFI Prime (30mn)

This is more clearly shown in the following drawing extracted from [AD 3] :



However, a number of issues changed the approach to be applied for the running of the scenario. These were :

1. HIFI could not be part of the AVM Herschel RMS (the ICU alone cannot produce any Science telemetry)
2. SPIRE FM IST/RMS can only be performed in Photometer mode because of cryostat autonomy).

The conclusion/result of issue 1 was that a decision was taken to replace HIFI in the AVM RMS test by SPIRE spectrometer mode (see below).

The conclusion/result of issue 2 was that the original planned SPIRE FM IST RMS will be photometer only (sequence can be re-used for FM as is). The same would be kept in AVM, and include the spectrometer mode in AVM only.

This led to two main test flows being generated – one for the AVM RMS test and the other for the FM RMS test:

### Herschel AVM RMS

- PACS Prime / Burst Mode (30mn)
- DTCP1: Switch PACS to SPIRE & include SPIRE cooler recycling (3h)
- SPIRE Prime Spectrometer (14h)
- DTCP2 : Switch SPIRE to PACS + PACS cooler recycle (3h)
- PACS Prime (14h)
- DTCP3 : Switch PACS to SPIRE + SPIRE cooler recycle (3h)

- SPIRE Prime Photometre (include peak-up) (14h)
- DTCP4 : Switch SPIRE to PACS + PACS cooler recycle (optional) (3h)
- PACS Prime (30mn)

The conclusion by Alcatel on this AVM RMS new flow was that most of this sequence could be re-used for FM IST/RMS where only the SPIRE Spectrometer will have to be replaced by HIFI as foreseen), but HIFI would not be used as the last instrument to keep the AVM & FM sequences as common as possible

### **Herschel FM RMS**

- PACS Prime / Burst Mode (30mn)
- DTCP1: Switch PACS to HIFI (3h)
- HIFI Prime including peak up (14h)
- DTCP2 : Switch HIFI to PACS + PACS cooler recycle (3h)
- PACS Prime (14h)
- DTCP3 : Switch PACS to SPIRE + SPIRE cooler recycle (3h)
- SPIRE Prime Photometre (include peak-up) (14h)
- DTCP4 : Switch SPIRE to PACS + PACS cooler recycle (optional) (3h)
- PACS Prime (30mn)

## **4. TEST STATUS REPORT FOR AVM RMS TEST – Draft 0.9**

### **4.1 AVM RMS Preparation Teleconferences – Major issues from each one**

Many telecons have been held to prepare for the AVM RMS test. This section provides a summary of what each telecon dealt with and its major issues.

#### **(a) 14<sup>th</sup> September 2006 - Alcatel Meeting to discuss RMS preparations**

Meeting held between MOC & Alcatel to discuss the RMS test and the Mission Timeline Inputs required by Alcatel for that test. It was clear at this point that the HSC needed to organise telecons with the ICCs to determine the way forward in obtaining inputs from them to generate the HSC MPS files i.e. POS/ICP

#### **(b) 11<sup>th</sup> October 2006 – HSC/MOC RMS Test organisation meeting with PACS & Alcatel**

Main conclusion was that PACS AVM was suitable to be used for the AVM RMS test. Various actions were put in place to address open points that needed to be clarified by PACS.

In addition, a first discussion was held as to the type of observations that could be run on the AVM and what inputs were required from PACS to allow HSC MPS to schedule such observations.

#### **(c) 19<sup>th</sup> October 2006 – HSC/MOC Test organisation meeting with SPIRE & Alcatel**

Main conclusion was that SPIRE AVM was suitable to be used for the AVM RMS test. Various actions were put in place to address open points that needed to be clarified by SPIRE.

In addition, a first discussion was held as to the type of observations that could be run on the AVM and what inputs were required from SPIRE for the HSC MPS to allow it to schedule such observations.

In the end it was concluded in the telecon that no\* spectrometer observations will be run in the AVM RMS as it is intended that the MTL generated by ESOC for the AVM RMS will not need to be changed for the FM RMS.

\*Note : See conclusions from HIFI telecon in (d) which turned around this conclusion

#### **(d) 20<sup>th</sup> October 2006 – HSC/MOC Test organisation meeting with HIFI & Alcatel**

Main conclusion was that HIFI AVM was NOT suitable to be used for the AVM RMS test.

This raised two issues; the first being that a second MTL will need to be produced for the FM RMS to include HIFI observations and the second that SPIRE can take advantage of these “HIFI” 14 hours by running spectrometer observations.

A discussion with Ken King (SPIRE) on the issue confirmed that he would produce inputs for the AVM RMS test relating to the Spectrometer observations.

**(d) 5<sup>th</sup> December 2006 – HSC/MOC Test organisation meeting with SPIRE & PACS & Alcatel**

The major topics addressed in this telecon were :

- Confirmation that a manoeuvre had been inserted by MOC in OD 81 which resulted in a new PSF being provided to the HSC by MOC
- Confirmation by HSC that they had received all the inputs from the ICCs that were required, AORs & CUS scripts and that three POS files for OD 80, 81 & 82 had been generated and provided to MOC
- Confirmation by MOC that they had successfully been able to process the POS file for OD 80 provided by HSC. They were in the process of looking at the POS files for the other ODs
- Agreement by SPIRE/PACS to provide the Cooler recycling command inputs using MOIS files
- They also understood that as the S/W was to be updated on the SPIRE & PACS AVMs then the DB to be used would need to be provided afterwards to the HSC & MOC. It was confirmed by Alcatel that the DB to be provided for the RMS test would be sent to the HSC at the end of January.

**(e) 21<sup>st</sup> February 2007 – HSC/MOC Test organisation meeting with SPIRE & PACS & Alcatel**

The major topics addressed in this telecon were :

- Confirmation by MOC that they had been able to successfully process all 3 POS files provided before Christmas by the HSC
- Alcatel proposed to the group that the SPIRE FM would be used in the AVM RMS test connected to the DRCU simulator. SPIRE agreed with this following closure of an appropriate action
- Alcatel confirmed that PACS S/w had been updated and that the SPIRE S/w Update was imminent. The DB to be used for the RMS was to be provided by Alcatel therefore by end February 07
- The schedule for the RMS was still up in the air as it needed to be agreed with Astrium. It was stated to Alcatel that the current schedule proposed a HIFI Debug run which was not required for the AVM and should be replaced by a formal AVM RMS test. Alcatel took an action to follow this up.
- This telecon also raised the question from the MOC as to the maximum number of telecommands that HSC would send.

**(f) 22<sup>nd</sup> March 2007 – HSC/MOC Test organisation meeting with SPIRE & PACS & Alcatel**

The major topics addressed in this telecon were :

- Confirmation that Alcatel would replace the HIFI Debug run by the formal AVM RMS 48 hour test
- Two major S/C NCRs were informed to the group i.e. CDMU software crashes after approximately 13000 Telecommands in the MTL are executed & Deletion of telecommands could also lead to a CDMS software crash. The second NCR was already fixed and to be released in a new CDMS version while the first would not be ready in time for the RMS debug runs but would be available for the formal AVM RMS run
- Alcatel informed that for the FM RMS test there should be a debug run set aside for the HIFI MTL to be tested. They took an action to check this.
- A new schedule was agreed based upon the now known dates of the RMS test whereby delivery dates of POS files from HSC & the resultant MTL files from the MOC were defined.

**(f) 29<sup>th</sup> March 07 - Fax from Alcatel to Astrium suggesting a new schedule for the AVM RMS test**

Extract from the fax :

Finally we would like to propose a different arrangement of this RMS sequence:

1. Start with session called RMS debug, where the 3 MTL's (SPIRE photo, PACS, SPIRE Spectro) are loaded, and run until the execution is stopped by a TC to bring the spacecraft into Earth Acquisition Mode (which stops the MTL) after approx 3h. Each of the 3 MTL's can be used during debug to verify the operation with each instrument/mode.
2. Interleave a period to eventually correct the bugs identified during this debug session. This would leave time to upgrade the CDMS software
3. Execute a 48h run for the RMS test using the AVM instruments (mainly to check that a long sequence can be executed. This phase needs to be performed in 3 shifts.

A short sequence dry run phase before the FM IST/RMS formal run in September must also be planned to guarantee the test success with the FM instruments, including HIFI.

**(f) 24<sup>th</sup> April 07 - HSC/MOC Test organisation meeting with SPIRE & PACS & Alcatel/Astrium**

The major topics addressed in this telecon were :

- HSC confirmed that they had provided the POS files for the three ODs to the MOC.
- MOC confirmed that the MTL uplink unit for OD 80 had been provided to Alcatel. As regards generation of the uplink units of OD 80, MOC had in fact to generate it manually due to problems with the mission planning system. This was a lot of work for Claudio Mevi.
- Alcatel confirmed that NCR 2797 "MTL interruption during performance test" was to be closed in a CDMU OBSM release to be used for the formal run of the AVM RMS test. However, for the debug runs the problem would still remain. As a result, only the 1st few hours of the MTL could be run in such a debug run. This was considered acceptable.
- it became clear in this telecon that both Astrium & Alcatel had not fully discussed the RMS test setup & preparations. A separate telecon was called for the next day to address the open points.
- MOC informed the telecon participants that due to problems in their Mission Planning System they would have difficulty delivering ODs 81 & 82 in time for Calendar Week 19 (7th May).
- As Peter Roelfsema from HIFI was also involved in this telecon, this agenda point was defined such that both he and the other FM RMS test participants could get an idea of the schedule of that test. Alcatel stated that the current schedule defined that the formal FM IST will take place at the End September/October. As a result, the inputs for this test i.e. MTL, should be provided by MOC by the end September at the latest.
- Finally, issues such as CCS-Instrument EGSE connections & location of ICC people at Astrium during the test were addressed.

**(f) 25<sup>th</sup> April 07 – Alcatel, Astrium, MOC & HSC telecon to discuss RMS dates**

The main conclusions were : The Preparation for Herschel RMS has been clarified

- SPIRE (spectro) RMS debug will take place week 19, PACS & SPIRE photo (week 21)
- 48h RMS need to be planned
- 2 successive shift needed for RMS debug
- MTL available for SPIRE spectro, & processed as Script. PACS & SPIRE photo scripts available from ESOC 4/5, for test mid week 19
- Satellite configuration clarified

**IMPORTANT NOTE:** The Spire Spectrometer Debug Run was made successfully on the 10<sup>th</sup> May 2007. The telecon on 16<sup>th</sup> May addresses preparations for the remaining debug runs.

**(f) 16<sup>th</sup> May 07 – Alcatel, Astrium, MOC telecon to discuss ACMS calibration parameter errors**

The main conclusions were :

- Solution to solve the raw vs calibrated parameters has been selected (ESOC proposition 2a : modify database to include calibrated ACMS parameters) has been selected.
- Investigation needed to check impact on ACMS SIT and IST.
- Database should be available mid week 21.
- RMS test can be resumed as soon as possible.

## 4.2 Actual Flow of events – HSC Log of RMS Test preparation

The following is a log of the activities performed by the HSC in preparation for the AVM RMS tests. It also includes MOC activities where dates are known.

There are two main HSC MPS files (POS/ICP files) generation periods. The first relates to the generation of files based upon MIB Databases existing at the end of 2006 and the second relates to the generation of files based upon the actual HPSDB to be used to run the AVM RMS test.

Note that HSC & ICC activities are in **red text** and MOC activities are in **Blue text**.

### 4.2.1 Generation of the RMS POS test files for the MOC – Oct/Nov/Dec 06

2006-10-20 KK (SPIRE) delivered photometer AORs  
 RMSv0.1.aor  
 RMSv0.1.tgt

2006-10-20 Received PSFs from MOC + initial attitude  
 0080\_0020.PSF  
 0081\_0020.PSF  
 0082\_0020.PSF

2006-10-24 MOC delivered corrected initial attitude

2006-10-26 JB (HSC) defined region of sky to be used for the observations

2006-10-26 AB (HSC) set up database "rms1" on hscsv2 schema version 26  
 HIFI - OBSERVINGMODES\_HIFI\_0\_34  
 PACS - OBSERVINGMODES\_PACS\_0\_26  
 SPIRE - OBSERVINGMODES\_SPIRE\_0\_20  
 MIB - MIBDATA\_MERGED\_0\_5

2006-10-27 KK (SPIRE) delivered spectrometer and (updated) photometer AORs  
 RMSv0.1.tgt  
 RMSv0.2p.aor  
 RMSv0.2s.aor

2006-10-30 JB (HSC) reported problem with SPhoto-0001  
 Parameter "opsMode" does not fit it's constraint

2006-10-30 KK updated CUS scripts in CVS to fix the problem

2006-10-30 JB (HSC) reported similar problem with SPhoto-0000 v2, SSpec-0000 & SSpec-0004

2006-10-30 AB (HSC) added SSpec-0000a v2 and SSpec-0004a v2 to fix this problem

2006-10-31 JB (HSC) Sent POS/ICP to MOC (using PSF 0080\_0020)  
 0080\_0001.POS  
 0080\_0001.ICP

2006-11-02 JB (HSC) Sent POS/ICP to MOC (using PSF 0082\_0020)

0082\_0001.POS  
0082\_0001.ICP

2006-11-06 AB (HSC) added SSpec-000a v3 and SSpec-001a v2

2006-11-07 RV (PACS) delivered AORs : RMS\_phase1\_IST\_AVM\_v1.0.aor

2006-11-08 AB (HSC) added PACS AORs to database

2006-11-08 All PACS observations failed with CUS exception:  
Value [-240] is not allowed by SCOS with ptc value 3 and pfc value 14

2006-11-09 ErW (PACS) delivered updated PACS MIB (v8.10) to fix the problem

2006-11-09 AB (HSC) updated database to use new (merged) MIB containing PACS update

Merged MIB: MIBDATA\_MERGED\_0\_7 containing:  
MIBDATA\_PACS\_0\_24 (PACS\_MIB\_N\_8\_10-with-empty-files)  
MIBDATA\_HIFI\_0\_31 (HIFI\_MIB\_96)  
MIBDATA\_SPIRE\_0\_12 (SPIRE\_MIB\_PFM3\_2.1.G2\_forHCSS)

2006-11-09 JB (HSC) confirmed that PACs observation can now be scheduled

2006-11-13 MOC delivered new PSF to allow delta-V manouevre  
0082\_0021.PSF

2006-11-22 Received feedback from MOC on POS 0080\_0001 delivered for FTS interface tests. This is similar to the one delivered for the RMS test, although observations are in a different order. All anomalies were as expected.

2006-11-29 JB (HSC) agreed with KK (SPIRE) to reduce the number of repetitions of SPhoto-006 and SPhoto-007 to allow for shorter science window.

2006-12-04 MR (ESOC) reported some anomalies in timing of POS 0082\_0001 - this was due to updated onboard DB parameters which were not made available to the HSC.

2006-12-04 DC (PACS) delivered CUS scripts for instrument setup

2006-12-05 DC (PACS) send correction to instrument setup scripts

2006-12-06 JB (HSC) reported problem with PACS instrument setup scripts

2006-12-06 MR (ESOC) delivered updated onboard database parameters

2006-12-06 DC (PACS) delivered corrected scripts and stated we would need updated PACS MIB (PACS\_MIB\_N\_8\_11\_

2006-12-07 JB (HSC) confirmed that parameters from updated onboard database corrected the timing problems with POS 0082\_0001

2006-12-07 Sent POS/ICP to MOC (using PSF 0082\_0021) to check corrected timing  
0082\_0002.POS  
0082\_0002.ICP

2006-12-07 DC (PACS) redeliver instrument setup scripts using CVS instead of email

2006-12-07 MR (ESOC) confirmed that timing of POS 0082\_0002 is OK

2006-12-08 Received new PACS MIB to correct problems with instrument setup scripts

2006-12-11 AB (HSC) created database "rms2@hscsv2" using AORs from CVS.  
MIBDATA\_MERGED\_0\_8  
OBSERVINGMODES\_PACS\_0\_33  
OBSERVINGMODES\_HIFI\_0\_40  
OBSERVINGMODES\_SPIRE\_0\_25

2006-12-12 JB (HSC) Adapted PACS instrument setup scripts to be dummy observations and asked DC to redeliver them with these changes.

2006-12-14 DC (PACS) redelivered instrument setup scripts via CVS as requested  
AB (HSC) created fresh database "rms2" for the test

2006-12-15 JB (HSC) created POS/ICP files as follows:

Software: HCSS-1094 with D\_MPS\_0\_117

Database: rms2@hscsv2 containing:  
MIBDATA\_MERGED\_0\_8  
OBSERVINGMODES\_PACS\_0\_34  
OBSERVINGMODES\_HIFI\_0\_40  
OBSERVINGMODES\_SPIRE\_0\_25  
AORs from CVS  
PACS setup observations added by JB (HSC)

Orbit file: H20060531\_0001.LOE

SIAM: 0001\_0001.SIAM

Only 4 instances of SSpec-0006 scheduled as changes to SPIRE CUS scripts have increased duration of observations.

Created FTS wrapper files:

POS\_\_HSCSDA\_D\_0080\_0002\_\_\_\_00000.HERS  
POS\_\_HSCSDA\_D\_0081\_0001\_\_\_\_00000.HERS  
POS\_\_HSCSDA\_D\_0082\_0003\_\_\_\_00000.HERS  
SIAM\_HSCSDA\_D\_0001\_0001\_\_\_\_00000.HERS

15-12-2006 Delivered POS/ICP/SIAM to MOC

21-02-2007 Telecon with MOC confirms that all files received have been successfully processed by FDS and EPOS files generated.

## 4.2.2 Generation of the RMS POS files for the MOC using the AVM RMS HPSDB

24-03-2007 HPSDB (MIB) provided by Alcatel  
 Alcatel ID: H-P-2-ASP-LI-1285\_is5\_FULLL\_HERSCHEL\_CCS  
 HSC ID: MIBDATA\_RMS\_0\_1

24-03-2007 HS: modified MIB to address outstanding issues

28-03-2007 HS: Further changes to MIB  
 - HSC ID: MIBDATA\_RMS\_0\_3

28-03-2007 AB (HSC): Tried MIBDATA\_RMS\_0\_3 with:  
 OBSERVINGMODES\_PACS\_0\_36 (as used for the AO)  
 OBSERVINGMODES\_SPIRE\_0\_27 (as used for the AO)  
 This gave error:  
 Type error from SpireBbStopDcuData at line 1845  
 Error: Incorrect number of arguments in call to Spire\_RESET\_FIFO5

This appears to be because the MIB now adds suffices to the parameter names, to allow duplicate names. This fails because PACS PHOT uses convert\_to\_raw statement which refers to a parameter name.

31-03-2007 Received updated CUS script from SPIRE.  
 However, there were still problems

02-04-2007 Received further update from SPIRE - now OK

02-04-2007 AB (HSC): Created new database rms3@hscsv2 using:  
 Schema: 27  
 MIB : MIBDATA\_RMS\_0\_3  
 PACS Observing Modes: OBSERVINGMODES\_PACS\_0\_36  
 SPIRE Observing Modes: RMSTEST\_02042007  
 AOR files: RMSTEST\_15122006 (The same AOR files as last time )

Note: this database was only used to generate a SPIRE schedule (OD=80).

02-04-2007 JB (HSC): Tried with MPS - All PACS LineSpec and RangeSpec failed  
 Problem in call to "convert\_to\_raw".

03-04-2007 JB (HSC): Generated POS/ICP for OD-80:

Using software versions: HCSS\_1176 & D\_MPS\_0\_128

mps\_rms\_80:

OD = 80

| ID | Start time           | Slew | Sec  | Title       | Mode               |
|----|----------------------|------|------|-------------|--------------------|
| 52 | 2008-05-18T16:08:38Z | 278  | 396  | SSpec-0006b | SpireSpectroPoint  |
| 53 | 2008-05-18T16:17:29Z | 135  | 396  | SSpec-0006c | SpireSpectroPoint  |
| 44 | 2008-05-18T16:25:13Z | 68   | 6903 | SSpec-0001a | SpireSpectroRaster |
| 49 | 2008-05-18T18:22:06Z | 110  | 1189 | SSpec-0005a | SpireSpectroPoint  |

|      |                      |     |       |             |                    |
|------|----------------------|-----|-------|-------------|--------------------|
| 47   | 2008-05-18T18:44:43Z | 168 | 3127  | SSpec-0003a | SpireSpectroPoint  |
| 54   | 2008-05-18T19:39:31Z | 161 | 396   | SSpec-0006d | SpireSpectroPoint  |
| 45   | 2008-05-18T19:48:26Z | 139 | 5079  | SSpec-0002a | SpireSpectroPoint  |
| 46   | 2008-05-18T21:15:04Z | 119 | 5079  | SSpec-0002b | SpireSpectroPoint  |
| 50   | 2008-05-18T22:41:31Z | 108 | 1189  | SSpec-0005b | SpireSpectroPoint  |
| 48   | 2008-05-18T23:03:42Z | 142 | 2069  | SSpec-0004a | SpireSpectroPoint  |
| 43   | 2008-05-18T23:40:23Z | 132 | 13149 | SSpec-0000a | SpireSpectroRaster |
| 51   | 2008-05-19T03:21:44Z | 132 | 396   | SSpec-0006a | SpireSpectroPoint  |
| SLEW | 2008-05-19T04:04:00Z | 282 | 0     |             |                    |

Successfully generated POS/ICP for OD 80: This is 28 min 49 sec shorter than the previous version 0080\_0002.

11-04-2007 JB (HSC): Patched PACS CUS definitions as follows:

Created branch OBSERVINGMODES\_PACS\_0\_36\_RMS

Edited as follows:

```
pacs_DMC_BIAS_R -> pacs_DMC_BIAS_R_160
pacs_DMC_BIAS_D -> pacs_DMC_BIAS_R_192
```

These changes were made to the files:

```
PacsSPECconfSet.txt
SPEC_CRE_setup.OP
SPEC_cre_setup.txt
SPEC_init_det_setup.OP
```

Tagged result: OBSERVINGMODES\_PACS\_0\_36\_RMS\_PATCH\_1

11-04-2007 AB (HSC): created new database rms4:

```
Schema: 27
MIB : MIBDATA_RMS_0_3
PACS Observing Modes: OBSERVINGMODES_PACS_0_36_RMS_PATCH_1
SPIRE Observing Modes: RMSTEST_02042007
AOR files: RMSTEST_15122006 (The same AOR files as last time )
```

13-04-2007 JB (HSC): Generated POS files:

Using software versions: HCSS\_1188 & D\_MPS\_0\_132

Create PACS setup observations using proptool:

```
Create 1 PHOT_setup_OBS
      1 SPEC_setup_OBS
      1 PACS_Spec_Curing_OBS
      1 OBCP_SAFE_OBS
      1 OBCP_SAFE_OBS
```

Note: Create one SAFE onbs twice rather than two at once, so that proptool doesn't do change RA and DEC values.

mps\_rms\_80

-----

OD = 80

| ID   | Start time           | Slew | Sec   | Title       | Mode               |
|------|----------------------|------|-------|-------------|--------------------|
| 52   | 2008-05-18T16:08:38Z | 278  | 396   | SSpec-0006b | SpireSpectroPoint  |
| 53   | 2008-05-18T16:17:29Z | 135  | 396   | SSpec-0006c | SpireSpectroPoint  |
| 44   | 2008-05-18T16:25:13Z | 68   | 6903  | SSpec-0001a | SpireSpectroRaster |
| 49   | 2008-05-18T18:22:06Z | 110  | 1189  | SSpec-0005a | SpireSpectroPoint  |
| 47   | 2008-05-18T18:44:43Z | 168  | 3127  | SSpec-0003a | SpireSpectroPoint  |
| 54   | 2008-05-18T19:39:31Z | 161  | 396   | SSpec-0006d | SpireSpectroPoint  |
| 45   | 2008-05-18T19:48:26Z | 139  | 5079  | SSpec-0002a | SpireSpectroPoint  |
| 46   | 2008-05-18T21:15:04Z | 119  | 5079  | SSpec-0002b | SpireSpectroPoint  |
| 50   | 2008-05-18T22:41:31Z | 108  | 1189  | SSpec-0005b | SpireSpectroPoint  |
| 48   | 2008-05-18T23:03:42Z | 142  | 2069  | SSpec-0004a | SpireSpectroPoint  |
| 43   | 2008-05-18T23:40:23Z | 132  | 13149 | SSpec-0000a | SpireSpectroRaster |
| 51   | 2008-05-19T03:21:44Z | 132  | 396   | SSpec-0006a | SpireSpectroPoint  |
| SLEW | 2008-05-19T04:04:00Z | 282  | 0     |             |                    |

Successfully generated POS/ICP for OD 80:

```
/local/data/rms/posicp/0080_0004.POS
/local/data/rms/posicp/0080_0004.ICP
```

Diff with previous 0080\_0003 files:

```
> diff 0080_0003.POS 0080_0004.POS
1c1
<
< COMMENT POS version: 0080_0003
---
>
> COMMENT POS version: 0080_0004
3c3
<
< COMMENT POS ICD version: 1.5
---
>
> COMMENT POS ICD version: 1.6
```

```
cat 0080_0004.ICP | sed -e 's/ C/ S/' > a # Changed for POS ICD 1.6
> diff 0080_0003.ICP a
```

**(No differences)!!**

mps\_rms\_81

-----

Omitted PSpecL-RMS-08 as PacsLineSpec observations were longer than before

OD = 81

| ID | Start time           | Slew | Sec  | Title         | Mode           |
|----|----------------------|------|------|---------------|----------------|
| 57 | 2008-05-19T07:09:13Z | 313  | 2700 | setup_1       | PHOT_setup_OBS |
| 1  | 2008-05-19T07:56:57Z | 164  | 153  | PPhoto-RMS-01 | PacsPhoto      |
| 2  | 2008-05-19T08:01:58Z | 148  | 612  | PPhoto-RMS-02 | PacsPhoto      |

|      |                      |     |      |               |                      |
|------|----------------------|-----|------|---------------|----------------------|
| 6    | 2008-05-19T08:14:30Z | 140 | 2222 | PPhoto-RMS-06 | PacsPhoto            |
| 4    | 2008-05-19T08:53:21Z | 109 | 1129 | PPhoto-RMS-04 | PacsPhoto            |
| 3    | 2008-05-19T09:14:59Z | 169 | 2772 | PPhoto-RMS-03 | PacsPhoto            |
| 5    | 2008-05-19T10:03:54Z | 163 | 2222 | PPhoto-RMS-05 | PacsPhoto            |
| 60   | 2008-05-19T10:43:22Z | 146 | 22   | setup_4       | OBCP_SAFE_OBS        |
| 58   | 2008-05-19T10:43:50Z | 6   | 2700 | setup_2       | SPEC_setup_OBS       |
| 12   | 2008-05-19T11:34:06Z | 316 | 1894 | PSpecL-RMS-06 | PacsLineSpec         |
| 8    | 2008-05-19T12:11:08Z | 328 | 2634 | PSpecL-RMS-02 | PacsLineSpec         |
| 11   | 2008-05-19T12:57:50Z | 168 | 2654 | PSpecL-RMS-05 | PacsLineSpec         |
| 10   | 2008-05-19T13:44:52Z | 168 | 2654 | PSpecL-RMS-04 | PacsLineSpec         |
| 13   | 2008-05-19T14:34:22Z | 316 | 5694 | PSpecL-RMS-07 | PacsLineSpec         |
| 7    | 2008-05-19T16:12:04Z | 168 | 317  | PSpecL-RMS-01 | PacsLineSpec         |
| 9    | 2008-05-19T16:22:27Z | 306 | 1737 | PSpecL-RMS-03 | PacsLineSpec         |
| 59   | 2008-05-19T16:54:14Z | 170 | 1408 | setup_3       | PACS_Spec_Curing_OBS |
| 17   | 2008-05-19T17:20:41Z | 179 | 1011 | PSpecR-RMS-03 | PacsRangeSpec        |
| 18   | 2008-05-19T17:40:20Z | 168 | 543  | PSpecR-RMS-04 | PacsRangeSpec        |
| 15   | 2008-05-19T17:52:11Z | 168 | 163  | PSpecR-RMS-01 | PacsRangeSpec        |
| 16   | 2008-05-19T18:00:22Z | 328 | 4411 | PSpecR-RMS-02 | PacsRangeSpec        |
| 21   | 2008-05-19T19:16:41Z | 168 | 163  | PSpecR-RMS-07 | PacsRangeSpec        |
| 19   | 2008-05-19T19:22:12Z | 168 | 1470 | PSpecR-RMS-05 | PacsRangeSpec        |
| 20   | 2008-05-19T19:49:30Z | 168 | 342  | PSpecR-RMS-06 | PacsRangeSpec        |
| 61   | 2008-05-19T19:57:56Z | 164 | 22   | setup_5       | OBCP_SAFE_OBS        |
| SLEW | 2008-05-19T20:04:00Z | 308 | 0    |               |                      |

Successfully generated POS/ICP for OD 81:

mps\_rms\_82

OD = 82

| ID   | Start time           | Slew | Sec   | Title        | Mode                 |
|------|----------------------|------|-------|--------------|----------------------|
| 30   | 2008-05-20T00:38:40Z | 280  | 739   | SPhoto-0006a | SpirePhotoPointJiggl |
| 28   | 2008-05-20T00:51:36Z | 37   | 1419  | SPhoto-0005a | SpirePhotoPointJiggl |
| 25   | 2008-05-20T01:16:20Z | 65   | 3643  | SPhoto-0003a | SpirePhotoSmall      |
| 32   | 2008-05-20T02:19:21Z | 138  | 739   | SPhoto-0006c | SpirePhotoPointJiggl |
| 26   | 2008-05-20T02:33:48Z | 128  | 1851  | SPhoto-0004a | SpirePhotoSmall      |
| 22   | 2008-05-20T03:06:38Z | 119  | 11005 | SPhoto-0000a | SpirePhotoLargeScan  |
| 35   | 2008-05-20T06:12:19Z | 136  | 399   | SPhoto-0007a | SpirePhotoPointJiggl |
| 31   | 2008-05-20T06:19:21Z | 23   | 739   | SPhoto-0006b | SpirePhotoPointJiggl |
| 29   | 2008-05-20T06:33:57Z | 137  | 1419  | SPhoto-0005b | SpirePhotoPointJiggl |
| 27   | 2008-05-20T06:58:44Z | 68   | 1851  | SPhoto-0004b | SpirePhotoSmall      |
| 37   | 2008-05-20T07:32:34Z | 179  | 399   | SPhoto-0007c | SpirePhotoPointJiggl |
| 23   | 2008-05-20T07:41:16Z | 123  | 9333  | SPhoto-0001a | SpirePhotoLargeScan  |
| 24   | 2008-05-20T10:18:45Z | 116  | 5470  | SPhoto-0002a | SpirePhotoLargeScan  |
| 36   | 2008-05-20T11:52:01Z | 126  | 399   | SPhoto-0007b | SpirePhotoPointJiggl |
| SLEW | 2008-05-20T12:04:00Z | 271  | 0     |              |                      |

Successfully generated POS/ICP for OD 82:

Create FTS wrapper files:

wrap\_fts\_rms POS 80 4

wrap\_fts\_rms POS 81 2

wrap\_fts\_rms POS 82 4

13-04-2007 Delivered files to MOC

16-04-2007 => 20-04-2007 Generation by FDS of EPOS/APF file and transfer to the MOC MCS

23-04-2007 CM (MOC) provision to Alcatel of the two Uplink Units covering OD-80 (the first one lasts up to the end of the DTCP, at 2008-05-18T16:04:00).

**NOTE : These have been generated Manually rather than using the MOC MPS.**

**Uplink Unit 1 (H\_IST0\_MTL\_D079\_080\_20070423\_v01.txt) contains:**

- Pre DTCP TT&C commands
- SPIRE cooler recycling sequence
- Commands to enable/disable VCI RT
- Command DC819160 to configure the Bus profile as for "SPIRE Prime" (parameter DH049160=3, SCBP\_03, as per document H-P-1-ASP-ID-0856, Issue 3.0 Draft)
- Sequences of commands DC169160 "ReportCatSelPktStore" every 1 hour, asking for reports from Herschel default stores (0,1,2,3 on SSMA and 128,129,130,131 on SSMMB)
- command ACWP1002 for Reaction Wheel Biasing
- command ACUE1002 for Update Sun and Earth Ephemerides

**Uplink Unit 2 (H\_IST0\_MTL\_D080\_081\_20070423\_v01.txt) contains:**

- Post DTCP TT&C commands
- all commands we received via POS
- commands ACAF1002 for Science Mode Fine Pointing requests
- Sequences of commands DC169160 "ReportCatSelPktStore" every 1 hour, asking for reports from Herschel default stores (0,1,2,3 on SSMA and 128,129,130,131 on SSMMB)

04-05-2007 MOC delivery all the MTL Uplink Units covering ODs 80-81-82. **Again, these have been generated Manually rather than using the MOC MPS.** A new version is released for all of them because now Uplink Unit 2 contains also the commands related to the DTCP in OD-81 plus some DC169160 and one command SCV00500 which was missing. Please use these updated versions for all Uplink Units from now on.

The general guidelines related to the content of the Uplink Units detailed below for the ones related to OD-80 are applicable to the full set of files. In particular, are still valid the considerations done (see email below) about the sequence **AESVV\_00 --> Upd S/C Orb Vel**, containing the two commands below:

The content of the EPOS files against the released Uplink Units have been compared now with an excel based tool and they are complete.

10-05-2007 Alcatel Email confirming successful conversion of MOC MTL uplink units to TCL scripts.

10-05-2007 Successful Debug run of SPIRE Spectrometer MTL

## 4.3 Data Flow & Objectives Validated at draft 0.9 of this document

### Data Files exchanged – Status

The following RMS generated data has been exchanged between the MOC and the HSC:

- Orbit files
- Orbit Event Files
- Planning Skeleton Files
- POS/ICP files
- EPOS files
- SIAM file
- SSO file

There are NO files left un-transferred between the HSC and the MOC for the MPS Chain Validation Scenario. All files have been exchanged via the operational interface (as well as by email).

There are however some interface mechanisms yet to be exercised within the MOC (TBC):

- Flight Dynamics to Scheduling office interaction
- Generation of MOC MPS output files.

It is important to mention at this stage that the generation of the MTL files provided to Alcatel was performed by hand rather than using the MOC MPS. This was due to a number of errors existing in the software that was in use by the Flight Control Team. A fix is expected to be delivered soon – see next section for more details.

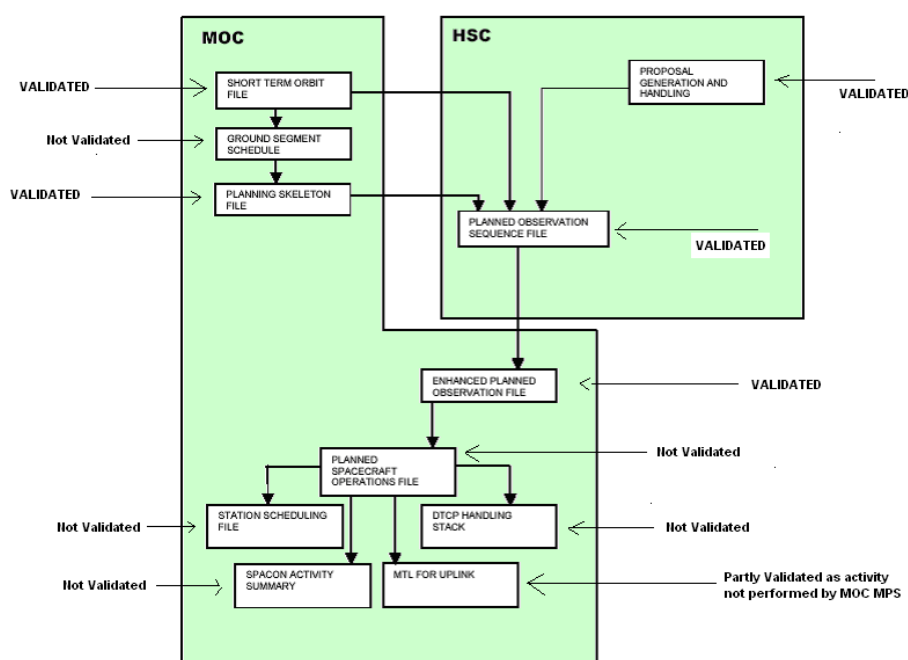
### Data Flow - Status

Here is the main data flow for the MPS Chain Validation Scenario:

1. FDS creates Long-term Orbit Event File - Validated
2. Long-term Orbit Event File transferred to Scheduling Office – Not Validated
3. Scheduling Office creates ESTRACK Schedule Allocation File (ESAF) – Not Validated
4. ESAF transferred from SCH to FDS – Not Validated
5. FDS creates PSF - Validated
6. PSF transferred from FDS to HSC – Validated
7. HSC imports extracted instrument MIBs from Alcatel provided HPSDB – Validated
8. HSC imports all Instrument proposals consisting of AOR files (Astronomical Observation Requests) into the HSC Operational DB – Validated

9. HSC performs a consistency check between these AOR files, the MIBs and the CUS scripts provided by the ICCs – Validated
10. HSC uses the Proposal Handling System to set all proposals as being accepted in the Operational DB
11. HSC then uses the Mission Planning System to schedule the proposals according to a timeline previously agreed with the MOC & HSC and consistent with the PSF file. It then creates a POS and ICP file for each OD – Validated
12. POS and ICP transferred from HSC to FDS – Validated
13. SSO & SIAM files used to generate POS/ICP files are transferred from HSC to FDS - Validated
14. FDS creates EPOS and APF - Validated
15. FDS transfers EPOS and APF to MCS for the Herschel MPS. It also transfers the files to the HSC – Validated
16. Herschel MOC MPS imports EPOS & APF files – Not Validated
17. Herschel MOC MPS exports the following files - Not Validated
  - The MTL for uplink (NOTE this was generated by Hand)
  - The manual stack of non-MTL commands for DTCP handling.
  - The spacon activity summary,
  - A station-scheduling file,
  - A ground station mission events file, which is passed back to the scheduling office
18. HSC retrieves the Spacecraft TM & Science TM from the DDS and confirms the link between uplink & downlink OBSID – Not Validated

The drawing below shows the data flow as defined in Section 2.1 whereby the main data flows are highlighted with the validation/non-validation status.



## Status of MPS Chain validation Scenario at as 24<sup>th</sup> May 2007

### MPS Chain Validation – Objectives Status

#### To Validate:

- The configuration and system-level interaction of the components involved - Ongoing
- The mission planning chain involving MOC, FDS and the science ground segment in exchange of all data products related to mission planning - Validated

#### To Verify:

- The correct process in updating the Operational system at the HSC with data inputs provided by the ICCs and the MOC - Validated
- The correct linking of the uplink & downlink chains via the OBSID concept – To be validated when DDS data is retrieved from the RMS test.
- The correct timing of events in performing the processing of data received from the ICCs and the MOC – Not Validated as timing is very much off-line
- The procedures relevant to the above interactions are correct – To be validated

### Subsystems used in the AVM RMS test preparation

- MOC Flight Dynamics Orbit Prediction & Manoeuvre Design subsystem - Validated
- MOC Scheduling Office using the ESTRACK Planning System (EPS) – Not Validated
- MOC Flight Dynamics Mission Planning Subsystem - Validated
- MOC MCS Mission Planning Subsystem – Not Validated
- MOC Mission Control System TC subsystem – Not Validated
- HSC Proposal Handling Subsystem - Validated
- HSC Mission Planning Subsystem – Validated
- Operational Data transfer using FTS (File Transfer Mechanism) – Validated

## 4.4 Activities yet to be performed for the AVM RMS test

The execution of the PACS & SPIRE MTLs on the Spacecraft remains yet to be performed. However, this is envisaged to be formally validated during the 48 hour AVM RMS test formal run.

The interaction between Flight Dynamics & the Scheduling Office is only now being validated. This interaction will be validated in the MPS Chain Validation test #2 i.e. FM RMS test preparation.

The use of the MOC MCS Mission Planning System whereby the EPOS/APF files provided by Flight Dynamics are imported and the various output files produced is envisaged to be performed in the coming two weeks. The output MTL file to be loaded on the MCS MTL stack shall then be compared with what has been provided to Alcatel for the AVM RMS test. *There should be no differences.*

This final check will validate the MOC MCS MPS and the MOC MCS TC subsystems.

## 5. TEST STATUS REPORT FOR AVM RMS TEST – Issue 1.0

### 5.1 Activities that have taken place since draft 0.9 (25<sup>th</sup> May 07)

#### (a) 24<sup>th</sup> & 25<sup>th</sup> May 2007 – PACS & SPIRE Debug runs on the AVM instrument setup

A debug run of the MTLs for PACS & for SPIRE (photo) was performed by Industry on the AVM instruments. Note that the SPIRE (Spect) debug run was performed on the 10<sup>th</sup> May 2007.

#### (b) 1<sup>st</sup> & 4<sup>th</sup> June 2007 – Debug Post test review telecons

A telecon was held on this date to discuss the problems that had arisen (NCRs were raised) and the way forward

The summary of the discussions is provided in Appendix A. Following this discussion a number of interactions were held with the instrument teams to determine exactly what models of the instruments should be used for the formal run of the AVM RMS test.

The decision was to run with the PACS AVM and the SPIRE FM (DRCU simulator).

#### (c) Tests by MOC of their new Mission Planning System

These tests were to confirm that their mission planning system could produce automatically the MTL Uplink Units.

#### (d) 6<sup>th</sup> July 2007 – Start of preparations for FM RMS Test

In parallel to the AVM RMS test preparations, the preparations began for the FM RMS test and the deliveries required to be made for that test (planned at this date for September 2007). No further mention shall be made of FM RMS preparations as this is not relevant to this test report i.e. the MPS Uplink & downlink test is the AVM RMS test. The FM RMS test is in fact using a then validated system.

#### (e) 20<sup>th</sup> June 2007 - Status of AVM RMS preparation @ITSG meeting

A presentation given by LO' Rourke at this meeting summarised the status as of this date :

- HSC has interacted with the ICCs (PACS & SPIRE) intensively to define the input AORs and the CUS scripts and to allow the generation of POS files consistent with the DB & S/W loaded on the AVM
- HSC has interacted with the MOC intensively for the exchange of Mission Planning System Products
- HSC provided the MOC with the POS files on 13th April 07.
- MOC provided the MTL files to Alcatel late April & Early May
- First debug runs have been run for SPIRE Spectrometer, SPIRE Photometer & PACS Spec & photo
  - Various NCRs have been raised including one against PACS AVM as it had a serious problem & didn't produce data
  - However, NONE have been raised against the HSC inputs to the MTL.
  - At this present moment, 30 minutes of the SPIRE Spectrometer MTL has been run and 4 hours of the SPIRE Photometer MTL have been run without problems.
- The formal AVM RMS test is TBC for the week of the 25th June.

Note on this date, the first set of PSFs for the FM RMS test were delivered to HSC.

**(f) 25<sup>th</sup> July – AVM & FM RMS telecon held with industry**

Here is an extract from those minutes relevant to the AVM preparation status :

Test to take place between 6 to 10 August.

- Status of test preparation. (test procedure, MTL, scripts)
- Test procedure & schedule draft by mid of next week. + technical meeting end of next week.
- PACS will deliver tomorrow a new AVM MIB, to be processed & delivered to ASED.
- SPU software will be updated before the test to take into account the EEPROM problem (allow to relocate the software avoiding the weak bit)
- SPIRE new FM database (to be delivered end of this week) can be used for this test.
- Databases (updated SPIRE FM & PACS AVM) to be delivered to both ASED and ESOC & HSC (MCS) (2<sup>nd</sup> August)
- Agreement of sequence (no PACS RMS debug before)
- Windows/ screens / AND's / synoptics to look after test have been improved and tested on 2<sup>nd</sup> AVM RMS run (SPIRE photo)
- Correction of time shift (1:00) Confirmed.
- Listening from ESOC to set up . Yes.
- AVM panel available on 6/8. Software to be updated this day
- Updated scripts for SPIRE to get to standby mode (correct problem seen before) will be available early next week (script & procedure)

**(g) 8<sup>th</sup> August – 48 hour AVM RMS test is run on the spacecraft**

A status report of the SPIRE tests was sent by S.Sidher to LO'Rourke :

" Spectro MTL done Phot MTL ongoing. No instrument problems but haven't received science TM on the I-EGSE (also true for PACS) - looks as if CCS didn't see it either - investigation under way."

A status report of the PACS tests was sent by B.Collaudin to LO'Rourke :

Going rather well, at least for SPIRE. (currently in photometer mode).

For PACS, in photometer mode there was an error in one of the TC (feedback from (missing) sorption cooler) which lead to the FDIR (PACS + S/C) to switch off the instrument. The TC execution were then inhibited until the passage to setup spectroscopy. We missed the set up (re-enable only subschedule & not PACS APID), then we had to generate quickly a script (from the MTL) to set-up spectroscopy manually, which worked. We thought that we had recovered as the first PACS observation OBCP worked properly, but the subsequent commands were not properly executed, and the operator switched PACS to Safe. We experienced also a crash of the CCS during SPIRE MTL upload (after 17 TC's only, during the 3rd DTCP, while dumping the mass memory). The MTL upload had to be finished manually, and SPIRE observation was not interrupted. Test should finish tonight, as expected.

After the test then a status report was provided by H.Feuchtgruber :

Hello Simon,

As just discussed, please find attached my notes on the PACS AVM RMS.

For some TBD/TBCs you know better than me when and what has been done actually on the CCS. I would be good to get also the telecommand history data for the PACS RMS part.

Despite the fact that no single PACS observations could be carried out with success, I would like to point out that PACS can make still an important check on the obtained telemetry if we get the On-Target\_Flag data. A simple table with at least accurate time and the Flag itself for the PACS part of the RMS would be sufficient.

Best regards,  
Helmut

Notes from AVM RMS Test:

=====  
HF, 8-Aug-2007

- PACS upload of shifted SPU OBSW into EEPROM successful
- PACS switch-on sequence: o.k.
- PACS in Non-prime mode: Function and data rate o.k.
- Filling of SSMM o.k.
  
- Cooler recycling commands which have been manually inserted into the MTL have been executed. Last two commands are in wrong order: Set BBID should come before Set OBSID. Further checks to be done.
- At the end the autonomy function to watch BOL\_T\_FPU was enabled causing obviously the related TM(5,2) events from PACS which ask CDMU to execute an FDIR OBCP. The CDMU did apparently not find the right OBCP due to some database error (TBC).
- The enabled autonomy function has then been disabled by a manual stack command
  
- PHOT\_Setup\_OBS worked until the point where the BOL\_PWR autonomy function was started, this caused another set of TM(5,2) from PACS which this time found the correct OBCP on the CDMU and PACS was switched off. Later it turned out that DMC had erroneously not been switched off by that OBCP.
  
- When creating the MTL, the assumption has been that the CDMU FDIR OBCPs were not yet loaded, therefore no risk for the proper execution of the MTL has been expected. However during the upgrade of the CDMU OBSW, also the FDIR OBCPs have been loaded, therefore this trouble occurred.
- In order to recover all commanding of PACS from the MTL was disabled and, just to be sure (we were told), the 4 PACS related FDIR OBCPs have been disabled.
  
- PACS has then been switched on manually again.
  
- The RMS schedule was then resumed at 2008.140.10.43.50.00 (RMS time) for SPEC\_setup\_OBS, but re-enabling PACS commanding did not work due to some TBC reasons. Therefore all commanding to PACS remained disabled for the time being. The commanding of SPEC\_setup\_OBS has been extracted from the MTL, converted into a manual Tcl script and sent to PACS with success, i.e. PACS was setup for spectroscopy. At this point it was noted that no diagnostic packets arrived neither at the IEGSE, nor on the CCS. Apparently the APID 1158 TM(21,3) packets were not enabled for downlink.
  
- The MTL was finally successfully resumed at the second spectroscopy observation at 2008.140.12.05.40.00 RMS time. SPEC HK and science has been seen at the IEGSE, however already after the first PACS OBCP "INT\_CALIB\_SPEC" a command could not be executed by the DMC due to

a timing problem. The command came too early and DMC was not yet ready to execute the command. This is probably (TBC) related to a too small `grat_def_time` parameter (=200ms only) in the call of this PACS OBCP. The default value in CUS is 20000ms, but normally this value should be calculated by the AOT logic based on the previous grating position.

The working assumption for the time being is an AOT logic or table bug, more investigations required.

- After this problem the DMC link went to stopped and no further DMC commands could be executed, causing generation numerous TM(1,8) packets.
- The CCS has finally commanded PACS successfully to SAFE mode at some TBD point in time.
- At 2008.02.03.30 RMS time PACS is functioning nominal in non-Prime mode during SPIRE observations.

Finally a status report from MOC was provided :

- 1) Congratulations to everybody contributing to the test: for the first time the S/C (HERSCHEL) was run from the MTL (more or less "autonomously") for more than 48 hours!
- 2) 1.5 Mbps on RF -> no TM received on NDIU (NCR: 000001-HP-335-3474)
- 3) RWL speeds (I didn't have time to synchronize with Flight Dynamics in order to find out what happened)
- 4) only VC3 dumps received, no VC2 (i.e. all TM [HK and SCIENCE in one Packet Store]). Packet Store definition not updated from RMS debug ?

#### **(h) AVM RMS Post Test review meeting held on 10<sup>th</sup> August to discuss NCRs raised**

The main conclusion from that wrap up meeting was the following :

**CONCLUSION :** Herschel 48h AVM RMS test was a successful test. It is a major achievement in the development of the HP program.

It has demonstrated for the 1<sup>st</sup> time the possibility to run the complete Spacecraft and instruments in an autonomous way (Long MTL execution, as during routine mission), and the link with the MOC.

Several problems have been identified and will be corrected for the IST.

One of the main problems being the performance of the CCS (crash during download of mass memory, and problems of reliability in upload of MTL).

#### **(i) 14<sup>th</sup> August – Data set from MOC becomes available on the DDS**

An email was sent by M.Schmidt with the following details :

Dear Larry, Dear all,

the data from the "AVM" RMS are available.

I'd like to propose the following approach:

- a quick test, which confirms the possibility to connect to the DDS and retrieve data shall be done as soon as possible, i.e. latest until end of this week. Therefore the current Mission Control Session shall be kept until Friday. Please contact Eduardo for details.

- proper DDS<-> HSC interface tests as part of the Integration and Test Activities coordinated by Frank shall be arranged. This is subject to current DDS limitations (see below) and due to scheduling MCS session set-up (i.e. we may need to configure the Herschel MCS for simulations, SVT preparation or other MOC internal purposes)

Please note the following:

- 1) current DDS tests are constraint by known DDS software problems. Within the ITSG Gianpiero was requested to provide a status report of the DDS, which is available and I attach herebelow. A proper version shall be available by end of August (24th Aug).
- 2) due to an (known) CCS limitation ASTRIUM has not used the operational packet store definition, but have recorded everything (HK and SCIENCE TM) in one single packet store under VC3 (Virtual Channel). For the retrieval process on the DDS this should not matter (requests don't refer to Virtual Channels or Data Streams [MCS routing of the various VCs]), provided that HSC doesn't check the TM packet headers for the Virtual Channel IDs. Can you confirm?
- 3) No HIFI data are available since HIFI was not ON and in STANDBY (as originally foreseen), due to failure during the UFT. Anyway it maybe worth involving HIFI and route SVM HK TM to them (just a proposal).
- 4) The DTCPs simulated during the RMS were as follows (simulated UTC):

|              | <b>start<br/>simulated UTC</b> | <b>stop<br/>simulated UTC</b> |
|--------------|--------------------------------|-------------------------------|
| <b>DTCP1</b> | 2008-05-18T13:04:00Z           | 2008-05-18T16:04:00Z          |
| <b>DTCP2</b> | 2008-05-19T04:04:00Z           | 2008-05-19T07:04:00Z          |
| <b>DTCP3</b> | 2008-05-19T20:04:00Z           | 2008-05-19T23:04:00Z          |
| <b>DTCP4</b> | 2008-05-20T13:04:00Z           | 2008-05-20T16:04:00Z*)        |

\*) end time of DTCP 4 is not accurate, since ESOC was listen-in for much longer time while AIV lost their DFE

5) the expected data are:

- no dump during DTCP 1 received: due to an (up to then unknown) problem, no TM is available to MOC when the DFE is in 1.5 Mbps and connected via RF. During the subsequent DTCPs ASTRIUM kindly deviated from their procedures and run the 1.5 Mbps via umbilical. As a consequence no recorded data prior to DTCP 1 is available via the MOC (for instance the PACS burst TM to fill up the SSMM prior to DTCP 1 you won't see on the DDS)
- no dump during DTCP 2: this DTCP was simulated to be the "missed DTCP" i.e. more data to be dumped during DTCP 3 and DTCP 4
- dump during DTCP 3 successful
- dump during DTCP 4 successful

Consequently the DDS shall contain data from ~2008-05-18T13:30:00Z (depending on when ASTRIUM uplinked the dump command) to ~2008-05-20T13:30:00Z. (Sorry, haven't retrieved the exact times yet).

Regards,  
 Micha

The implications of problems in the data were found to be as follows from the HSC perspective :

- There are quite a large number of data gaps

- TM OOL data (APID = 1910) : No data : From the MCS' point of view no HK TM was received at all and thus no OOL packets. HK TM is expected on VC2 and it was received on VC3 (science data). Nothing can be done to work around this problem.
- TCO time couples (APID = 1911) : No Data : The packets are in the archive but with the wrong epoch (bug). They all have year 1996. but they can be requested manually by requesting this:
 

| SourcePktsGenStartTime     | SourcePktsGenEndTime       | SampleSize |
|----------------------------|----------------------------|------------|
| 1996-05-18T13:04:07.916726 | 1996-05-20T17:02:15.930739 | 72         |
- TCO2 time correlation coefficients (APID = 1912) -> 122 bytes file
- TM derived data (APID = 1913) -> empty file: ok, no data expected
- Telecommand history (CMH) -> empty file: ok, no data expected as MOC did not send the commands.

**(j) Week of the 17<sup>th</sup> August through to 10<sup>th</sup> September 07 – DDS data retrieval**

From the 17<sup>th</sup> onwards the HSC started to retrieve data from the DDS (with initial setup problems).

**(k) Delivery of AHFs from MOC to HSC for AVM RMS test**

**(l) 3<sup>rd</sup> October 2007 – AVM RMS DB propagated to SPIRE ICC**

**(m) 17<sup>th</sup> October 2007 – AVM RMS DB propagated to PACS ICC**

**(n) 17<sup>th</sup> to 19<sup>th</sup> December 2007 – Retrieval from MOC of AVM RMS DB to HSC**

In this case we tested successfully the DDS operational accounts.

**(o) 15<sup>th</sup> & 17<sup>th</sup> July 08 – full replay of DDS data to check consolidation status & HSC DDS client**

During the months of 2008, the DDS interface was used quite regularly. On the 15<sup>th</sup> & the 17<sup>th</sup> July 2008, a full replay of the AVM RMS Data set was performed at MOC to test the consolidation process and the HSC capability to retrieve the data on-line during the test. This test was successful.

Most data sets were retrieved during that test in such a way that the actual test case status can now be formally closed out with that test.

**(p) 23<sup>rd</sup> to 30<sup>th</sup> July 08 – propagation of AVM RMS DB to SPIRE**

The ingestion of the DDS retrieved TM was via the HCSS TM ingest functionality. It was then propagated on to SPIRE such that they can run their pipelines on the data.

**THIS CONCLUDES THIS REPORTING OF THE ACTIVITIES RESULTING FROM THE AVM RMS TEST.**

## 5.2 Data Flow & Objectives Validated at issue 1.0 of this document

### Data Files exchanged – Status

The following RMS generated data has been exchanged between the MOC and the HSC:

- Orbit files
- Orbit Event Files
- Planning Skeleton Files
- POS/ICP files
- EPOS files
- SIAM file
- SSO file

There are NO files left un-transferred between the HSC and the MOC for the MPS Chain Validation Scenario. All files have been exchanged via the operational interface (as well as by email).

There are however some interface mechanisms yet to be exercised within the MOC (TBC):

- Flight Dynamics to Scheduling office interaction
- Generation of MOC MPS output files.

It is important to mention at this stage that the generation of the MTL files provided to Alcatel was performed by hand rather than using the MOC MPS. This was due to a number of errors existing in the software that was in use by the Flight Control Team. A fix is expected to be delivered soon – see next section for more details.

### Data Flow - Status

Here is the main data flow for the MPS Chain Validation Scenario:

1. FDS creates Long-term Orbit Event File - Validated
2. Long-term Orbit Event File transferred to Scheduling Office – Validated (in internal MOC tests)
3. Scheduling Office creates ESTRACK Schedule Allocation File (ESAF) – Not Validated
4. ESAF transferred from SCH to FDS – Validated (in internal MOC tests)
5. FDS creates PSF - Validated
6. PSF transferred from FDS to HSC – Validated
7. HSC imports extracted instrument MIBs from Alcatel provided HPSDB – Validated
8. HSC imports all Instrument proposals consisting of AOR files (Astronomical Observation Requests) into the HSC Operational DB – Validated
9. HSC performs a consistency check between these AOR files, the MIBs and the CUS scripts provided by the ICCs – Validated

10. HSC uses the Proposal Handling System to set all proposals as being accepted in the Operational DB
11. HSC then uses the Mission Planning System to schedule the proposals according to a timeline previously agreed with the MOC & HSC and consistent with the PSF file. It then creates a POS and ICP file for each OD – Validated
12. POS and ICP transferred from HSC to FDS – Validated
13. SSO & SIAM files used to generate POS/ICP files are transferred from HSC to FDS - Validated
14. FDS creates EPOS and APF - Validated
15. FDS transfers EPOS and APF to MCS for the Herschel MPS. It also transfers the files to the HSC – Validated
16. Herschel MOC MPS imports EPOS & APF files – Not Validated
17. Herschel MOC MPS exports the following files - Validated
  - The MTL for uplink
  - The manual stack of non-MTL commands for DTCP handling.
  - The spacon activity summary,
  - A station-scheduling file,
  - A ground station mission events file, which is passed back to the scheduling office
18. HSC retrieves the Spacecraft TM & Science TM from the DDS and confirms the link between uplink & downlink OBSID – Validated

### **MPS Chain Validation – Objectives Status**

#### **To Validate:**

- The configuration and system-level interaction of the components involved - Validated
- The mission planning chain involving MOC, FDS and the science ground segment in exchange of all data products related to mission planning – Validated

#### **To Verify:**

- The correct process in updating the Operational system at the HSC with data inputs provided by the ICCs and the MOC – Verified
- The correct linking of the uplink & downlink chains via the OBSID concept – Verified
- The correct timing of events in performing the processing of data received from the ICCs and the MOC – Verified
- The procedures relevant to the above interactions are correct – Verified

## 5.3 Interface Requirements Validation Status

### **Here is the list of Interface Requirements specific to this test & their validation status :**

- FGS-IR-3.1-120 The MOC shall make available the spacecraft orbit predicted data to the HSC.
  - Validated
- FGS-IR-3.1-140 The HSC shall pull spacecraft predicted orbit data updates from the MOC.
  - Validated
- FGS-IR-3.1-210 The MOC shall make available to the HSC the planning skeleton information for any given scheduling period.
  - Validated
- FGS-IR-3.1-230 The HSC shall pull planning skeleton information from the MOC.
  - Validated
- FGS-IR-3.1-270 The MOC shall make available to the HSC the mission timeline summary corresponding to any given operational period.
  - Validated (EPOS & Manual Stack Dump files provided)
- FGS-IR-3.1-290 The HSC shall pull the new mission timeline summary from MOC.
  - Validated
- FGS-IR-3.1-295 The MOC shall make available the mission timeline summary before the uplink of the corresponding mission timeline to the spacecraft.
  - Validated
- FGS-IR-3.1-350 The MOC shall make available the spacecraft reconstituted orbit data to the HSC.
  - Validated
- FGS-IR-3.1-370 The HSC shall pull spacecraft reconstituted orbit data from the MOC.
  - Validated
- FGS-IR-3.1-550 The MOC shall make available the orbit events corresponding to a given operational period.
  - Validated
- FGS-IR-3.1-570 The HSC shall pull the orbit event data from the MOC.
  - Validated
- FGS-IR-3.4-10 The HSC shall make available to the MOC the observations schedule corresponding to any given scheduling period.
  - Validated
- FGS-IR-3.4-30 An observations schedule made available to the MOC by the HSC shall be compatible with the spacecraft operational and design constraints.
  - Validated
- FGS-IR-3.4-50 The HSC shall push observations schedules to the MOC.
  - Validated

## APPENDIX A – RMS Debug telecon minutes - 1<sup>st</sup> & 4<sup>th</sup> June 07

PURPOSE :

**Herschel RMS debug slot 2 wrap-up.  
 D1 with SPIRE (1/6)  
 D2 with PACS (4/6)**

CLASSIFICATION :

| ATTENDEES         | FIRM  | SIGNATURE | ATTENDEES           | FIRM  | SIGNATURE |
|-------------------|-------|-----------|---------------------|-------|-----------|
| Eric Sawyer (d1)  | SPIRE |           | Andrew Knight       | TAS-F |           |
| Allan Dowell (d1) | SPIRE |           | Laurence O'Rourke   | ESAC  |           |
| Sunil Sidher (d1) | SPIRE |           | Gilles Beaufils     | TAS-F |           |
| Bernard Collaudin | TAS-F |           |                     |       |           |
| Simon Hamer       | ASED  |           | Otto Bauer (d2)     | PACS  |           |
| Markus Koelle     | ASED  |           | H.Feuchtgruber (d2) |       |           |
| Alexandra Gatti   | ESA   |           |                     |       |           |
| WRITTEN BY :      |       |           |                     |       |           |

CONCLUSION :

|                                    |                             |   |
|------------------------------------|-----------------------------|---|
| <u>DISTRIBUTION :</u><br>ATTENDEES | <i>FOR FURTHER ACTION :</i> | ESOC: M.Schmidt<br>TAS-F: P.Couzin, B.Gobillot, Y.Roche, D/Montet<br>ASED: S.Idler, R.Hohn. |
|                                    | <i>FOR INFORMATION :</i>    |   |

APPROVED BY

| NAME      |  |  |  |  |
|-----------|--|--|--|--|
| SIGNATURE |  |  |  |  |

| CONTINUED :  | ACTION                   |  |       |                   |      |  |   |  |  |                           |
|--|--------------------------|--|-------|-------------------|------|--|---|--|--|---------------------------|
| <p><b>Agenda:</b></p> <ul style="list-style-type: none"> <li>- Summary of the RMS test (see attached mail)</li> <li>- Main NCR generated and status (see list below, to be continued), but NCRs should have been reviewed in NRB/NCR wash-up)</li> <li>- Way forward               <ul style="list-style-type: none"> <li>- additional debug session needed or not ?</li> <li>- 48h RMS run in hybrid configuration (Herschel + SPIRE FM, PACS AVM): yes or not</li> <li>- Preparation for FM RMS:                   <ul style="list-style-type: none"> <li>- Confirmation that PACS (OD 81-82) &amp; SPIRE photo (OD 82-83) MTL's can be used as is for FM,</li> <li>- When HIFI RMS (OD 80-81) can be made available</li> <li>- Finalisation of procedures</li> <li>- Identification of next test slot</li> </ul> </li> </ul> </li> </ul>  |                          |  |       |                   |      |  |   |  |  |                           |
| <p><b>Summary of the RMS test (see attached reports)</b></p>   |                          |  |       |                   |      |  |   |  |  |                           |
| <p>24/5: PACS MTL could be uploaded, but PACS command could not be executed (rejected by DPU). Failure in the PACS AVM.<br/>         PACS commands have been disabled. Satellite part of RMS could be executed correctly.<br/>         To be continued in a delta teleconference with PACS.</p>  |                          |  |       |                   |      |  |   |  |  |                           |
| <p>25/5: SPIRE photometer:RMS. (4h observation run) (was 30mn on spectrometer)<br/>         During ACSM -&gt;on board reconfiguration to bus B (due to CCU)<br/>         Recovered before autonomy period.<br/>         During execution spire command failures (1, 8). VM table (BSM jiggle position map I missing (NC3324). This problem is understood by SPIRE. The table should have been uploaded in the OBSW. To be corrected in the test script, during the DTCP.<br/>         SPIRE does not receive the packet type (5,1) (NO_TIMESYNCH_ID);<br/>         Related to NC 3273. (CCS database related, NRB needed urgently)<br/>         The log is not available (due to other NCR).</p> <p>SPIRE ask about DTCP activities.</p> <ul style="list-style-type: none"> <li>- Satellite set up (ACMS, upload MTL)</li> <li>- PACS burst mode to fill the memory</li> <li>- SPIRE to standby, then cooler recycling, then photometer standby</li> </ul> |                          |  |       |                   |      |  |   |  |  |                           |
| <p>The set up of the instrument to "photometer standby" should be part of the MTL. (in case we miss the ground).<br/> <b>This has to be included in the MTL for the formal RMS run (to be executed during DTCP).</b><br/>         Similar, cooler recycle was included in the MTL (was not executed in that test). Instrument shall be in READY mode for that.</p>   | <p><b>AI1- SPIRE</b></p> |  |       |                   |      |  |   |  |  |                           |
| <p><b>NCR's</b></p>  |                          |  |       |                   |      |  |   |  |  |                           |
| <table border="0"> <thead> <tr> <th>Test</th> <th>NCR nb</th> <th>Title</th> </tr> </thead> <tbody> <tr> <td>SPIRE Spectro RMS</td> <td>3283</td> <td>SPIRE DRCU Sim anomaly during RMS debug SPIRE/CDMU</td> </tr> <tr> <td colspan="3">→Works only during SPIRE PRIME bus profile, which is not nominal. Switch on procedure shall be updated by SPIRE (clearer, less acknowledgements) to be compliant with the non</td> </tr> </tbody> </table>  | Test                     | NCR nb   | Title | SPIRE Spectro RMS | 3283 | SPIRE DRCU Sim anomaly during RMS debug SPIRE/CDMU | →Works only during SPIRE PRIME bus profile, which is not nominal. Switch on procedure shall be updated by SPIRE (clearer, less acknowledgements) to be compliant with the non |  |  | <p><b>AI 2: SPIRE</b></p> |
| Test   | NCR nb                   | Title  |       |                   |      |  |   |  |  |                           |
| SPIRE Spectro RMS  | 3283                     | SPIRE DRCU Sim anomaly during RMS debug SPIRE/CDMU |       |                   |      |  |   |  |  |                           |
| →Works only during SPIRE PRIME bus profile, which is not nominal. Switch on procedure shall be updated by SPIRE (clearer, less acknowledgements) to be compliant with the non  |                          |  |       |                   |      |  |   |  |  |                           |

|   |                                  |
|---|----------------------------------|
| <p>shall be updated by SPIRE (slower, less acknowledgements) to be compliant with the non prime bus profiles, with max 3TM/s (incl HK + acknowledgment) and max 1TC/s (no problem observed during UFT as SPIRE prime bus profile was used, and no other instrument was ON)</p> <p>SPIRE Spectro RMS 3284 IST RMS RWL stiction problems tba<br/>         SPIRE Spectro RMS 3293 TC DFE Aggregate enable causes queue full on CDMU CDMU<br/>         SPIRE Spectro RMS 3294 MTL Load Fails with loss of command interface to Satellite EGSE<br/>         SPIRE Spectro RMS 3295 CCS IFMGR Process Crash during RMS debug CCS/HPSDB<br/>         SPIRE Spectro RMS 3296 CCS PDSTC process failure during RMS MTL load CCS<br/>         SPIRE Spectro RMS 3297 PACS dummy MTL script error (command parameter) HPSDB<br/>         SPIRE Spectro RMS 3298 Nominal HKTM fails start after transition to SPIRE Spectro- Standby SPIRE<br/>         → Can be closed. New test script to be sent by SPIRE &amp; to be tested</p> <p>SPIRE Spectro RMS 3299 RMS MTL SPIRE &amp; CDMU time-tagged TCs in verification history not updating Inst/HPSDB<br/>         → Either CCS or SPIRE problem. To be investigated further.</p> <p>SPIRE Spectro RMS 3300 RMS MTL SCM mode commands reported failed tba<br/>         SPIRE Spectro RMS 3301 Parameters for Loading OBCP Event Action Tables Missing HPSDB<br/>         PACS RMS 3316 No telemetry from PACS AVM SPU<br/>         PACS RMS 3317 Command parameter out of range in MTL test script<br/>         PACS RMS 3318 RMS MTL SCM line scan command overlaps<br/>         SPIRE Photo RMS 3324 SPIRE command failures (1,8) in POF3 observations during RMS debug<br/>         → BSM jiggle position map to be included &amp; loaded in the next version of SPIRE scripts (to be run during DTCP<br/>         NCR washup next tuesday. (instruments) &amp; wednesday 10:00 (satellite)</p> | <p>Cancelled<br/>(see below)</p> |
| <p><b>Way forward</b></p>   |                                  |
| <ol style="list-style-type: none"> <li>1. additional debug session needed or not ?</li> <li>2. 48h RMS run in hybrid configuration (Herschel + SPIRE FM, PACS AVM): yes or not</li> <li>3. Preparation for FM RMS:             <ul style="list-style-type: none"> <li>- Confirmation that PACS (OD 81-82) &amp; SPIRE photo (OD 82-83) MTL's can be used as is for FM,</li> <li>- When HIFI RMS (OD 80-81) can be made available</li> <li>- Finalization of procedures</li> <li>- Identification of next test slot</li> </ul> </li> </ol>   |                                  |
| <p>PACS test should be redone, but the PACS AVM is not operational (however additional 1 day debug not possible with PACS now).<br/>         It is also desirable to run a 48h session AVM RMS.<br/>         PCDU swap to be done in June (2 weeks)<br/>         CDMS software to be updated. (DRB today), and to be verified<br/>         Instruments FM will arrive end June (PACS) and 10/7 (HIFI).</p>  |                                  |
| <p>FM formal RMS will take place in September, and the FM MTL will be prepared for that time.<br/>         However it is desirable to run debug session before with FM units (&amp; FPU)<br/>         PACS AVM MTL is designed to be used with AVM &amp; has to be updated for</p>  |                                  |

|   |  |
|---|--|
| <p>FM. It should be clarified with PACS if it can be used with WU's only.</p> <p>SPIRE AVM MTL has been used with FM WU's, but cannot be used when the FPU is connected.</p> <p>As we have both AVM and FM panels for PACS, it is possible after PACS FM WU integration &amp; UFT to swap the panels (reinstall the PACS AVM panel) to run the 48h RMS (if PACS AVM is operational)</p>   | <p>AI 3 - ASED to confirm</p>  |
| <p>To be continued with PACS Monday 3pm.</p>  |  |
| <p><b>PACS RMS Monday 3pm.</b><br/>       NRB on PACS NCR 3318 too place between 2:30-3:00.<br/>       Main outcome is further analyses required, and command + log files to be sent to PACS.<br/>       TAS-F check that the PACS MIB is still the AVM (unmodified)</p> <p>Question from ASED:<br/>       Can PACS be powered at all following the problem on NCR 3318.<br/>       Answer of PACS is NO.</p> <p>PACS UFT should be repeated (when instructed by PACS)</p> <p>PACS confirm that PACS FM shall not be used to run the PACS RMS..</p> <p>PACS confirm that the PACS MTL needs to be re-generated for the FM RMS.</p> <p>PACS also considered that the PACS instrument shall be switched on in PACS Prime mode.</p> <p>It is agreed that for all instruments, the instrument shall be switched on with the corresponding instrument prime bus profile.<br/>       This happen Once in flight + after instruments switched off<br/>       But happens every day during test.</p> <p>CDMS software compatible with MTL will be installed on Herschel FM on 18/6/07 (after PCDU swap).</p> <p>Way forward:</p> <ul style="list-style-type: none"> <li>• PACS UFT (to close NC 3316)</li> <li>• Then 48h RMS.</li> </ul> <p>ASED to propose a test slot for the PACS UFT and the 48h RMS.</p> <p>TAS-F to propose a time for availability of FM MTL</p> <p>For 48h RMS the 1h difference between the MTL and the script (giving one 1 difference between observations and ACMS) should be corrected.</p> <p>Question from ESA:</p> | <p>AI 4 - TAS-F - BC</p> <p>ASED</p> <p>ASED. SI</p> <p>TAS-F BC</p> <p>TAS-F GB</p> |

|  |             |
|--|-------------|
| <p>Was PACS in Burst mode profile (7) during the problem (NC3316)<br/>Answer= YES. PACS has been switched on in Burst mode profile.<br/>Bus profile history during the PACS RMS test to be clarified by ASED</p> <p>Should the test be repeated in the prime burst profile ?</p> | <p>ASED</p> |
|  |             |

| INITIATOR<br>Firm / person | ACTION |   |                           | DATE    |
|----------------------------|--------|---|---------------------------|---------|
|                            | N°     | DESCRIPTION   | ACTIONEE<br>Firm / person | 1.5 DUE |
|                            | 1      | The set up of the instrument to "photometer standby" should be part of the MTL. (in case we miss the ground). This has to be included in the MTL for the formal FM RMS run (to be executed during DTCP).  | SPIRE                     | 31/7    |
|                            | 2      | SPIRE Spectro RMS 3283 SPIRE DRCU Sim anomaly during RMS debug<br>SPIRE/CDMU<br>→ Works only during SPIRE PRIME bus profile, which is not nominal. Switch on procedure shall be updated by SPIRE (slower, less acknowledgements) to be compliant with the non prime bus profiles, with max 3TM/s (incl HK + acknowledgment) and max 1TC/s<br>(no problem observed during UFT as SPIRE prime bus profile was used, and no other instrument was ON) | SPIRE<br>Cancelled        |         |
|                            | 3      | As we have both AVM and FM panels for PACS, it is possible after PACS FM WU integration & UFT to swap the panels (reinstall the PACS AVM panel) to run the 48h RMS (if PACS AVM is operational)   | ASED                      | 15/6    |
|                            | 4      | TAS-F check that the PACS MIB is still the AVM (unmodified)   | TAS-F BC                  | 8/6     |
|                            | 5      | PACS UFT should be repeated (when instructed by PACS) ASED to propose a slot  | ASED SI                   | 8/6     |
|                            | 6      | ASED to propose a test slot for the 48h RMS.  | ASED. SI                  | 8/6     |
|                            | 7      | TAS-F to propose a time for availability of FM MTL  | TAS-F BC                  | 8/6     |
|                            | 8      | For 48h RMS the 1h difference between the MTL and the script (giving one 1 difference between observations and ACMS) should be corrected.   | TAS-F GB                  | 15/5    |
|                            | 9      | Bus profile history during the PACS RMS test to be clarified by ASED  | ASED-SH                   | 8/6     |
|                            |        |   |                           |         |
|                            |        |   |                           |         |

## Annex 1:

### RMS Debug Summary for 24<sup>th</sup> & 25<sup>th</sup> May 2007

#### **PACS Photometer RMS 24<sup>th</sup> May**

- Switch ON of SVM nominal
- At PACS switch on it was found that the BOLC power supply had not been switched off after the previous days test (autonomous switch-off of instruments by FDIR). PACS switched off and on again in correct sequence and appeared OK, but when commanded to burst mode no science data produced. Check of HKTM showed DPU reporting “No New TM” from SPU. PACS powered off and on again but same status from SPU reported. Time-tagged commands rejected by DPU. It was agreed to disable TT release for PACS commands to investigate the anomaly further. The investigation showed no obvious reason for the anomaly. Analysis of previous CCS session logs show that the DPU had been reporting the same SPU problem since the 16<sup>th</sup> May, however this was not identified because PACS had not been operated in Science mode in the intervening period. The last good SPU status was observed on 15<sup>th</sup> May. NCR-3316 raised.
- During MTL load (for OD082-OD083 – 2<sup>nd</sup> test script) in DTCP period CCS reported parameter AHHD002 range error when trying to build command ACAL1002 for uplink, earlier ACAL1002 commands were uploaded successfully. After several uplink failures (for the same reason) the test script was aborted. NCR-3317 raised.
- A number of ACMS SCM Line Scan and Raster Pointing commands were reported as rejected due to one command not completing execution before the next command started. Identified as a problem in the new calibration curves in the HPSDB, which appear to be inverted. NCR-3318 raised (note may be related to NCR-3317 – TBC).
- ACMS slew command timeout problem recurrence (NCR already existing)
- DTCP period activities: TX in RF command OK plus ranging, CEL & SSMM dump performed successfully (however not science data because of PACS SPU anomaly). Need to synchronise monitoring of ephemerides (reports) with actual update performed in MTL. Also need to synchronise end of DTCP activities with MTL commands.

#### **SPIRE Photometer RMS 25<sup>th</sup> May**

- Delay in configuring EGSE for test (time update – access to cleanroom required)
- Switch on of ACMS delayed due to SSMM initialisation beforehand – should have been in parallel – test script updated.
- During ACMS switch on onboard reconfiguration to Bus B/PM-B due to CCU wraparound health check (known problem) - TBC. Due to time constraints left on PM-B but bus switched back to A. ACMS switched off and on again to ensure correct configuration.
- After separation it LCL 45 & 46 for thrusters were still open. Believed to be a result of the reconfiguration. LCLs manually commanded closed.
- Due to time constraints and known problem with PACS SPU, instrument was not switched on and therefore no burst mode performed to fill SSMM. Also, again to save time, OBCP not loaded either.
- Only DTCP part of MTL loaded before start of DTCP. Enable release of TCs command showed all TT commands enabled for execution on CCS OBQ Display, however when MTL started commands were not executed. Identified that the Release of the subschedule ID (=30)

was also required for the MTL service. This command had been used previously however CCS OBQ display did not show the TT commands to be enabled. Possible NCR required on CCS.

- TM lost temporarily because of the failed execution of the TT commands for TT&C S/S, until video link could be re-established.
- Ground commanding activities performed in DTCP period but no SPIRE cooler recycling was possible because of the subschedule still being disabled. MTL upload for autonomy period for SPIRE PHOTO was performed in DTCP without problem (1012 TT commands loaded).
- Resynchronisation with planned RMS activities achieved before end of DTCP period: ACMS commanded to required configuration for end of DTCP; SPIRE Prime bus profile set and commanded to PHOTSTBY. However, needs to be clarified whether commanding to PHOTSTBY should actually be nominally included in the MTL; Transition to PHOTSTBY did not restart Nominal HK TM (same problem as seen for SPECTSTBY and debug STBY-OPS) - manually commanded successfully; Final action was commanding release of the subschedule ID (=30).
- Execution of MTL then nominal except for known events for ACMS (command overlap) plus SPIRE command failures 1,8 (and success 1,7) reported in POF3 observations. It appears a required VM table (BSM jiggle position map) is missing. NCR to be raised for missing table and another for conflicting type 1 entries.
- A type 5,1 NO\_TIMESYNC\_ID event packet on CCS for SPIRE, RAL indicate this is expected – but needs to be explained. However the packet was not seen on SPIRE IEGSE - needs investigation as appears the SPID is correctly defined in the HPSDB.
- During SSMM dump at end of test TM DFE reports queue overflow. Not clear whether this was due to the earlier TT&C problems (which may have left TM DFE at 150Kbps when onboard downlink set to 1.5Mbps) or some other reason. To be investigated and NCR raised if necessary.

## SPIRE-Photometer RMS debug, Friday May 28<sup>th</sup>

Here follows some points to complement S. Hammer summary (Mail May 27<sup>th</sup>).

### 1.6 LCL 45 & 46 for thrusters not open

In addition to this anomaly, it has been also observed that the TWTA was not turned ON at separation. Both operations are commanded at separation by the RM (CCS 6), letting suspect that neither RM-A or B have been triggered properly by separation strap opening. According both TM and TC history check, they were nevertheless properly enabled, and all the separation were properly open.

An attempt has been made at the end of the test to recover the CDMS RM log, for off line checking of the incident. As the proper script was unknown from the operating team, this attempt has rely on manual commanding, using CDMS\_TC(6,5) at address 0AFF-7E00 (RM-A) and 0DFF-7E00 (RM-B) with N=256 (SAU 8 bit) as documented in BSW user manual. The commands were rejected (TM(1,2)).

An attempt has been then made to recover the RM-log pointers, in the RM-A and B registers "x2c" (log memory buffer start address) and "x04" (next log write pointer in buffer) using a CMDS\_TC(8,4,109,17). The commands were successful, but returned data was 0000 for the 4 commands.

⇒ All those anomalies shall be explained in the frame of an NCR to be risen.

⇒ It shall be part of normal AIT procedure to ensure at the end of a test, or after a test incident, that all the data useful for the session post analysis are correctly archived. This includes :

- CDMS and ACMS RM-A and RM-B log data.
- CDMS CEL and ACMS "event buffer" (both SGM-A and SGM-B ones, in both cases).
- SSMM packet store data (both from SSMM-A and SSMM-B).

Any operation team in charge of operating the S/C, shall be aware of those procedures, and able to run them.

Here, without the RM-log data, analysis of the separation incident may be very difficult. It is only expected that this was indeed done in the frame of some of the "turn off" procedure scripts.

### 1.7 SPIRE service 1 anomaly

It has appeared during SPIRE MTL execution, that some TM(1,8) was detected. Curiously, all MTL TC were nevertheless reported "green" with respect to execution by the CCS "command history display" (no alarm).

In parallel to SPIRE team investigation that has pointed out the VM table problem, a detailed analysis of the TM has been done on one of the event, to segregates between a real SPIRE problem, or a CCS anomaly.

The hereunder data are considered reliable data, has the key PSEQ and PID data have been verified "by hand" from the TC and TM "raw" data (i.e. at packet binary level).

MTL commanding

| Time tag | TC description | Allocated PSEQ |  |
|----------|----------------|----------------|--|
| 03:15:28 | SET_OBS_STEP   | D2C6           |  |
| 03:16:04 | SET_BBID       | D2C7           |  |
| 03:16:04 | SET_OBS_STEP   | D2C8           |  |
| 03:16:05 | RUN_VM         | D2C9           |  |
| 03:06:37 | FLUSH_FIFO     | D2CA           |  |

PID 1D00 TM packets (SPIRE essential HK)

| PSEQ  | TM description              | Time tag                  | TM data                   |
|-------|-----------------------------|---------------------------|---------------------------|
| FDA7  | 1280_TM(1,7)                | 2008.141.03.16.04.65<br>2 | PID : 1D00 PSEQ :<br>D2C7 |
| FDA8  | 1280_TM(1,1)                | 2008.141.03.16.04.90<br>2 | PID : 1D00 PSEQ :<br>D2C8 |
| FDA9  | 1280_TM(1,3)                | 2008.141.03.16.04.90<br>2 | PID : 1D00 PSEQ :<br>D2C8 |
| FDA A | 1280_TM(1,7)                | 2008.141.03.16.04.90<br>2 | PID : 1D00 PSEQ :<br>D2C8 |
| FDAB  | 1280_TM(5,1)                | 2008.141.03.16.04.90<br>2 |                           |
| FDAC  | 1280_TM(1,1)                | 2008.141.03.16.05.65<br>2 | PID : 1D00 PSEQ :<br>D2C9 |
| FDAD  | 1280_TM(1,3)                | 2008.141.03.16.05.65<br>2 | PID : 1D00 PSEQ :<br>D2C9 |
| FDAE  | 1280_TM(1,7)                | 2008.141.03.16.05.65<br>3 | PID : 1D00 PSEQ :<br>D2C9 |
| FDAF  | 1280_TM(3,25)               |                           | Hk                        |
| FDB0  | 1280_TM(1,5) Step :<br>0000 | 2008.141.03.16.05.65<br>4 | PID : 1D00 PSEQ :<br>D2C9 |
| FDB1  | 1280_TM(1,5) Step :<br>0000 | 2008.141.03.16.05.65<br>4 | PID : 1D00 PSEQ :<br>D2C9 |
| FDB2  | 1280_TM(1,8) Err :<br>0840  | 2008.141.03.16.05.66<br>5 | PID : 1D00 PSEQ :<br>D2C9 |
| FDB3  | 1280_TM(1,8) Err :<br>0840  | 2008.141.03.16.05.66<br>6 | PID : 1D00 PSEQ :<br>D2C9 |
| FDB4  | 1280_TM(3,25)               |                           | Hk                        |

So seven TM(1,x) have been generated by SPIRE for one single TC " RUN\_VM" with the following anomalies :

- 1) a TM(1,8) "execution failure" have been generated AFTER a TM(1,7) "successful execution completion" was transmitted for the same TC. Those two TM shall be mutually exclusive.
  - 2) the TM(1,8) packet has been sent twice.
  - 3) a TM(1,5) "execution in progress" have been generated AFTER a TM(1,7) "successful execution completion" for the same TC. This is incoherent.
  - 4) the TM(1,5) packet has been sent twice (i.e. the two packet "STEP" index is the same).
- ⇒ All those anomalies shall be explained and corrected in the frame of the NC.

## 1.8 Invalid buffer check sum (5,4) events

Two TM(5,4) events "SSMM - invalid buffer check sums" have been observed.

Such alarms are observed during MTL and OBCP first activation. This was not here the context of their observation.

⇒ Those anomalies shall be explained in the frame of an NC to be open, unless it may be related somehow to the anomalous separation one.

## 1.9 CCS

### 1.9.1 TM plotting tool failure : data "black hole"

An attempt at plotting the DE32F170 along the test has failed.

Trying several times, it has been observed that it was possible to plot the data after about 03:50:00 , before 03:00:00, but that there was some "data black hole" which was:

1 - not possible to plot

2 - was causing the deletion of any earlier correctly plotted data if attempted to be plotted.

A similar problem occurs in a Planck test session in Turin (1<sup>st</sup> RMS attempt, February 22nd) , leading to the impossibility to plot any ACMS TM data from a "black hole" of about 1 hour, just centred on a spurious ACMS reconfiguration (so the most interesting data) . The plotting tool failure has not been reported in detail in an NCR because on this events : all the data retrieval (event history, packet history, etc.) failed indeed. So the NCR has been global.

The fact that this "black hole" affects also all the other displays has not been verified here. It is however quite remarkable, that the "black hole" corresponds more or less to the time were the CDMS have reconfigured after the CCU wraparound problem.

This would suggests that the multiple TM packet counter/packet date discontinuities typically induced by a CMDS or ACMS reconfiguration, can result in some circumstances, to some mess in the S/C TM data archiving system, plaguing any ulterior data retrieval.

⇒This shall be analysed and clarified.