

# Herschel

Title:

Test Report for SPIRE FM Post-Shipment/Pre-Launch He1 CFT In Kourou

CI-No:

112 200

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04.03.2009

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File: HP-2-ASED-TR-0340\_1 SPIRE He1 CFT in Kourou.doc



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| Issue | Date     | Sheet | Description of Change | Release |
|-------|----------|-------|-----------------------|---------|
| 1     | 04.03.09 | All   | Formal Issue          |         |
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### 1 Scope

This document reports on the SPIRE CFT at He1 conditions, performed in the frame of the HERSCHEL S/C Health Check and Pre-Launch verification at CSG, Kourou, French Guiana on the 27<sup>th</sup> February 2009.

The test was executed with the S/C in vertical position using the Herschel CCS & I-EGSE.

### 1.1 Objective

The objective of this CFT was:

 To check the correct functional operation of the SPIRE FM under He1 conditions on nominal and redundant side prior to Launch

In the frame of this test the SPIRE SMEC Launch Latch status was also verified to be still locked and the LPU operation was also checked (ACS HP-2-ASED-SD-0469 refers).

Two further tests were also included in the session:

- ACS: HP-2-ASED-SD-0470: SPIRE Spectrometer Switch-on Test (leaving SSW Vss2 and Vdd2 switched off) to support NCR4705 closeout
- PVS #4: Check MilBus B interfaces to SPIRE Nominal and Redundant DPUs

#### 1.2 Test Flow

The overall test flow of the SPIRE FM CFT was as follows:

| Date       | Time  | Action   |
|------------|-------|--|
| 25/02/2009 |       | Verify SMEC Launch Latch Status (AD3 Steps 1-17)   |
| 26/02/2009 | 23:19 | Configure EGSEs and Power ON SVM (AD1 Section 7.2.1 in conjunction with AD2 Section 7.5 and AD5 Steps 1-13), PVS #5, #6 & #7 |
| 27/02/2009 | 00:43 | PVS #3 SPIRE LPU Check (AD5 Steps 22-31)   |
| 27/02/2009 | 00:52 | Power on SPIRE Nominal as per AD1, chapter 7.2.2.1   |
| 27/02/2009 | 01:17 | Run Nominal CFT Procedures as per AD1, chapter 7.2.2.2 – 7.2.2.24  |
| 27/02/2009 | 04:48 | SPR1187 Raised, PVS #8 called to repeat procedure to switch Photometer Detectors OFF   |
| 27/02/2009 | 04:52 | Continue Nominal CFT Procedures as per AD1,  |

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|            |       | chapter 7.2.2.25 – 7.2.2.29   |
|------------|-------|---|
| 27/02/2009 | 05:59 | PVS #2: Perform SPIRE Spectrometer Detector Switch ON test (AD4)          |
| 27/02/2009 | 05:59 | PVS #4: Perform Nominal/Redundant CDMS Bus switching (SVM SFT activity)   |
| 27/02/2009 | 06:15 | Power off SPIRE Nominal as per AD 1, sections 7.2.2.30 – 7.2.2.32         |
| 27/02/2009 | 06:29 | Power on SPIRE Redundant for SFT as per AD 1, section 7.2.3.1             |
| 27/02/2009 | 06:45 | Run Redundant CFT Procedures as per AD1, sections 7.2.3.2 – 7.2.2.20      |
| 27/02/2009 | 08:08 | PVS #9 Skip AD1 sections 7.2.2.21 - 7.2.2.23                              |
| 27/02/2009 | 08:11 | Continue Redundant CFT Procedures as per AD1, chapter 7.2.2.24 – 7.2.2.25 |
| 27/02/2009 | 08:26 | PVS #9 Skip AD1 sections 7.2.2.26 - 7.2.2.28                              |
| 27/02/2009 | 08:27 | Complete Redundant CFT Procedures as per AD1, chapter 7.2.2.29            |
| 27/02/2009 | 08:27 | PVS #4: Perform Nominal/Redundant CDMS Bus switching (SVM SFT activity)   |
| 27/02/2009 | 08:29 | Power off SPIRE Redundant as per AD 1, section 7.2.2.30 – 7.2.2.32        |
| 27/02/2009 | 08:44 | Power off S/C & EGSE  |

Table 1: SPIRE He1 CFT in Kourou Test Summary

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Procedure Execution Summary:

This test has been run with the HERSCHEL S/C in vertical position at CSG, Kourou on SPIRE nominal and redundant units. The "as run" procedures are attached to this report (see Appendices 1 - 5).

The test duration of the SPIRE CFT Test was  $\sim$  9.5 hours (from S/C OFF - S/C OFF).

Location: CSG, Kourou, Building S1

Test Session Name:

2009\_02\_26\_22\_55\_hercdmu\_hpws21\_REALTIME\_SPIR

E\_SFT

Environment: HP\_2\_ASED\_TP\_0217\_iss2\_SPIRE\_COLD\_END\_001

OBSW: CDMS 3.8.0.1, ACMS 4.0 B004

HPSDB: HP-ASP-LI-1441\_28

HPCCS Release: HPCCS Release\_2.0-1317

TRR MoM (AD6): HP-2-ASED-MN-1650 PTR MoM (AD7): H-P-TAS-MN-11295

Procedure variations of the CFT as recorded in the Procedure Variation Summary in § 8.1 for the corresponding "as-run" procedure are:

PVS#1 S/C left powered On – NOT USED PVS#2 SPIRE Spectrometer switch On test

PVS#3 Functional part of LL check

PVS#4 Switch to Bus B and back to Bus A

PVS#5 Different Power On/Off (ACS HP-2-ASED-SD-0471)

applicable to AD2 not this procedure

PVS#6 No SSMM, No MTL, No OBCP Upload

PVS#7 RedMarks to ACS HP-2-ASED-SD-0471 applicable to AD2 not

this procedure)

PVS#8 SPR1187 – PDET-P switch Off PVS#9 Skip Steps to Reduce Test Time

All non-compliances are recorded in the Observation/NCR Summary below as applicable and detailed further in Section 3.

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# Documents/Drawings

# 1.3 Applicable Documents

| AD1 | SPIRE FM Cold Functional Test – As Run                                     | HP-2-ASED-TP-0217,<br>Issue 2 |
|-----|--|-------------------------------|
| AD2 | Herschel PCDU & CDMS Nominal Switch On/Off<br>Procedure – As Run           | HP-2-ASED-PR-0070,<br>Issue 5 |
| AD3 | SPIRE LPU Check at CSG – As Run  | HP-2-ASED-SD-0469,<br>Issue 1 |
| AD4 | SPIRE Spectrometer Switch ON Test – As Run                                 | HP-2-ASED-SD-0470<br>Issue 1  |
| AD5 | Manual Operation of BDR's During Failure Investigation on the LPS/SAS SCOE | HP-2-ASED-SD-0471<br>Issue 1  |
| AD6 | TRR for Spire SFT Kourou MoM   | HP-2-ASED-MN-1650             |
| AD7 | SPIRE CFT in Kourou PTR MoM  | H-P-TAS-MN-11295              |

### 1.4 Reference Documents

None

### 1.5 Other Documents

None

### 1.6 Acronyms & Abbreviations

See "as-run" procedure.

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#### 2 Main Observations and Problems Identified.

The following NCR's reoccurred during this run of the SPIRE CFT:

### 2.1 NCR3513 - During RMS 48 hrs, SPIRE TC sequence errors

This NCR was expected to recur during the test. There is an outstanding action for ESA to confirm that the NCR can be closed as "use as is" (with an associated SPIRE documentation update).

### 2.2 SPR1187 - SPIRE-IST-COLD-PDET-OFF-P TC Mismatch

This SPR was raised due to an incompatibility between the SPIRE IEGSE CUS configuration and the above test script, resulting in a difference between the number of TCs expected from the IEGSE and the number received. A workaround was put in place on the IEGSE to allow the script to execute successfully. This workaround was also applied for the SDET OFF sequence and also for redundant CFT. SPR has been closed.

### 2.3 Procedure Changes

No updates or clarifications have been identified during the CFT procedure.

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### 3 Summary

The SPIRE CFT He1 at CSG, Kourou was successfully performed on both, nominal and redundant side.

During the CFT a number of SPIRE related activities were also performed successfully, namely:

- Reduced configuration JFET switch on test AD4
- Spectrometer Mechanism LPU and Launch lock status checks AD3
- CDMS Redundant MilBus Interface verification PVS #4

### 3.1 Open Issues

None specifically from this test, however the following SPIRE NCRs are pending closeout verification:

### NCRs requiring closeout verification by test at CSG, Kourou:

NCR 4804 – Unexpected triggering of SPIRE\_OPE\_STOP OBCP after SPIRE STANDBY OBCP

NCR 4827 – IST-2: Recovery commands issued after SPIRE OBCP

#### NCRs requiring closeout verification by documentation update:

NCR 3512 – During RMS 48, SPIRE DPU reports missing Time Sync Pulse on MIL Bus 1553

NCR 3513 – During RMS 48 hrs, SPIRE TC sequence errors (TBC – AI on ESA)

NCR 4705 – TBTV SPIRE? detector problem in spectroscopy

NCR 4725 - TBTV - VC1 Overflow During SPIRE TV Cold

NCR 4805 – IST2 FDIR OBCP: Nominal HK stops after SPIRE OBCP DRCU OFF

#### 3.2 Requirements Verified

With the above CFT, the functional health-check of the SPIRE instrument after transport to CSG, Kourou, French Guiana and fitness for launch has been proven.

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# 4 Appendix 1: Functional AIT Logbook Extract

The following observations were made during the test (extract from AIT logbook):

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| Date                                   | 26/02/2009   |   |  |  |  |
|--|--|---|--|--|--|
| Operator                               | B. Chen, S. Ilsen  |   |  |  |  |
| Test Director/ Test                    | TD D. Colloudin/TC C. Illan /Lata) C. Llamar (Night)         |   |  |  |  |
| Conductor                              | TD B. Collaudin/ TC S. Ilsen (Late), S. Hamer (Night)        |   |  |  |  |
| Shift Leader                           | C. Much  |   |  |  |  |
| QA                                     | D. Hendry (Early), R. Goossens (Late), J. Rautakoski (Night) |   |  |  |  |
| EGSE                                   | L.Allegretti (late) I. Luck (early)                          |   |  |  |  |
| Test Case                              | SPIRE SFT  |   |  |  |  |
| OBSW                                   | CDMS 3.8.0.1, ACMS 4.0 B004                                  |   |  |  |  |
| HPSDB                                  | HP-2-ASP-LI-1441 issue 28                                    |   |  |  |  |
| HPCCS Release                          | HPCCS_2.0-1317   |   |  |  |  |
| Test Environment /                     | LID O ACED TO COAT Seed COURT COLD END COA                   |   |  |  |  |
| Version                                | HP_2_ASED_TP_0217_iss2_SPIRE_COLD_END_001                    |   |  |  |  |
| Session ID                             | 2009_02_26_22_55_hercdmu_hpws21_REALTIME_SPIRE_SFT           |   |  |  |  |
|  | Regression   |   |  |  |  |
|  | Debuaaina  |   |  |  |  |
|  | NCR Investigation  |   |  |  |  |
| Purpose of Test                        | Calibration/Maintenance                                      |   |  |  |  |
|  | Unit Integration Testing                                     |   |  |  |  |
|  | <del>Drv</del> / Formal                                      | X |  |  |  |
| SW PACS SPIRE HIEL COMS ACMS CCS HPSDR |  |   |  |  |  |

| Time/Date | Test Procedure / Step / Script / Command  |   | NCR'S/ |
|-----------|---|---|--------|
| UTC       | / Event / Anomaly   |   | SPR's  |
|           | Thursday Februar  | y 26th 2009   |        |
|           | Environmental conditions: in ambient  | t, T ?? gr C , RH ??%, S/c in S1B   |        |
| 22:55     | New session started for SPIRE SFT   |   |        |
| 23:19     | Captains Log, Stardate 2602092319   | We have set on a new mission to the SPIRE System where we have traced a distress call from an unknown species called "The Planck" |        |
| 23:19     | After we have setup the BoB's for the manual operation of the BDR's i.a.w. ACS SD-0471 iss 1 they where connected in between both Umbilicals by ASTRIUM/ A. Grasl; After verification of the setup we then followed both the ACS SD-0471and PR-0070 for the switchon. |   |        |

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| 23:42 | The point in the switch-on script POWER_ON_HER_IST where the manual BDR switching has to be performed (step 6) is not as mentioned in the ACS as Luigi discovered (until error message is displayed for the remote operation of BDR1 via SAS SCOE); Instead it shall be performed when error message " YM 664952 'LPS_bus_v_n_DAQ' TM isn't validated " is displayed |   | PVS#7<br>SD-0471 |
|-------|--|---|------------------|
| 23:44 | When BDR1 was switched it immediately triggered a safety loop  | Luigi proposed a different approach by leaving BDR1 ON and BDR2 OFF, then acknowledging the safety loop on the Battery Simulator, then Switch the Battery SIM online; If this goes well then switch ON BDR2.  After consultation with Engineering from TASF/YR we got the ok for go-ahead | PVS#7<br>SD-0471 |
| 23:55 | The updates approach was successful, we have power for the S/C !!!!  |   |                  |
| 23:55 | Continued with S/C power-on per TP-0070  |   |                  |
|       | Friday February  | 27th 2009   |                  |
| 00:35 | S/C power-on completed   | CCU online, SSMM, MTL and OBCP loading skipped  | PVS#6<br>TP-0070 |
| 00:41 | Start with SPIRE Launch Lock verification i.a.w. PVS#3   |   | PVS#3<br>TP-0217 |
| 00:49 | Finished SPIRE Launch Lock check   |   |                  |
| 00:52 | Start with SPIRE CFT !!!!!   | Yihaw !!!   |                  |
| 01:09 | SPIRE SWITCHED-ON in NOMINAL   |   |                  |
| 02:10 | XPND-1 Uplink Part 1   | WunderBra   |                  |
| 03:40 | XPND-2 Uplink Part 1   | Bravo!  |                  |
| 04:10 | Command resetscoparams K* sent   | To clear misleading information on CCU valve status VS504 and VS505   |                  |
| 04:14 | SPIRE-IST-COLD-PDET-OFF-P.tcl failed   | Mismatch between script expected value and EGSE value   | SPR-<br>1187     |
| 04:46 | SPIRE-IST-COLD-PDET-OFF-P restarted  | Successful  | PVS#8<br>TP-0217 |
| 06:03 | Running PVS#2 and HP-2-ASED-SD-0470<br>SPIRE Spectrometer switch on test   |   | PVS#2<br>TP-0217 |
| 06:12 | Running PVS#4  |   | PVS#4<br>TP-0217 |
| 06:20 | Switch off SPIRE   |   |                  |
| 06:20 | Command completion failure on DCT85170(DisableActions)   | Expected because EAT tables have not been loaded  |                  |
| 06:20 | Command completion failure on DCT84170(EnableActions)  | Expected because EAT tables have not been loaded  |                  |

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| 06:22 | Completed SPIRE nominal CFT                 | Successfully                         |         |
|-------|---|--------------------------------------|---------|
| 06:37 | Switch On SPIRE redundant                   |                                      |         |
| 00.40 | Command failed SCR01500                     | Expected because HKTM has been       |         |
| 06:42 | (CLEAR_HK_REPORT)                           | stopped                              |         |
| 00.40 | Command failed SCR01500                     | Expected because HKTM has been       |         |
| 06:42 | (CLEAR_HK_REPORT)                           | stopped                              |         |
|       | Skipped test scripts sections 7.2.3.21,     |                                      | PVS#9   |
| 08:08 | 7.2.3.22, 7.2.3.23, 7.2.3.26, 7.2.3.27,     |                                      | TP-0217 |
|       | 7.2.3.28                                    |                                      | 1F-0217 |
| 08:30 | Running PVS#4                               |                                      | PVS#4   |
| 00.30 | Rulling F V3#4                              |                                      | TP-0217 |
| 08:38 | Switch off SPIRE                            |                                      |         |
| 08:41 | Command completion failure on               | Expected because EAT tables have not |         |
| 00.41 | DCT85170(DisableActions)                    | been loaded                          |         |
| 08:42 | Command completion failure on               | Expected because EAT tables have not |         |
| 00.42 | DCT84170(EnableActions)                     | been loaded                          |         |
|       | Script                                      |                                      |         |
| 08:57 | Z010999MCVT002_POWER_OFF_HER_IST            |                                      |         |
| 00.57 | reports several errors as the SAS LPS SCOE  |                                      |         |
|       | is not switched on                          |                                      |         |
| 09:22 | BDR opened manually and continue switch     |                                      |         |
| 09.22 | off script                                  |                                      |         |
|       | Note that the power off script is trying to |                                      |         |
|       | continue as normal and is now commanding    |                                      |         |
|       | a switch over to PM-B to check the EEPROM   |                                      |         |
|       |   |                                      |         |
|       | Therefore we aborted the call to            |                                      |         |
|       | PM_SELECT and continued with the            |                                      |         |
|       | power off                                   |                                      |         |
|       |   |                                      |         |
|       | This MAY influence the next switch-on e.g.  |                                      |         |
|       | The Crome registers?                        |                                      |         |
|       | SC Switched Off, Cryo SCOE monitoring       |                                      |         |
| 09:46 | disabled and SC handed over to AIT.         |                                      |         |
| 09:49 | Close test session.                         |                                      |         |

Table 2: Functional AIT Logbook Record

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# 5 Appendix 2: SPIRE FM Cold Functional Test As-Run Procedure

(ref. HP-2-ASED-TP-0217, issue 2)

Doc. No: HP-2-ASED-TR-0340

Issue:

Date: 04.03.09

Title: IST Instrument Commissioning SPIRE FM Cold Functional Test

CI-No: 125200

Test Procedure Herschel

A S Ruw 27/62/09.

IST Instrument Commissioning SPIRE FM Cold Functional Test

Cl-No: 125200

Prepared by:

S. Hamer

Date: 17.02.2009

Checked by:
A. Koppe

Product
Assurance:

Configuration
Control:

Project
Management:

D. Montet

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| Issue | Date     | Sheet | Description of Change   | Release |
|-------|----------|-------|---|---------|
| 1     | 08.05.08 | All   | First Formal Issue  |         |
| 1.1   | 30.05.08 | All   | Updates to reflect redlining from 1 <sup>st</sup> SMEC test in Hel plus addition of LL latch relay status check for nominal and |         |
|       |          |       | redundant. Minor typos + replacement of outstanding S/C level TBCs/TBDs   |         |
| 1.2   | 01.07.08 |       | Typo in I-EGSE connection cmd removed (YC00X966) Update of power on/off details for CFT   |         |
|       |          |       | Opuate of power official details for of 1   |         |
| 1.3   | 03.07.08 |       | Implementation of new issue (2.5) of RD2, SPIRE Cold  |         |
|       |          |       | Functional Test Procedures, SPIRE-RAL-PRC-2398  Implementation of new issue (2.6) of RD2, SPIRE Cold                            |         |
| 1.4   | 23.07.08 |       | Functional Test Procedures, SPIRE-RAL-PRC-2398  |         |
| 2.0   | 17.02.09 |       | Update power on/off sequence to handle standalone CFT Correct section 7.2.3.16 & 7.2.3.18 for SMECENCPWR                        |         |
|       |          |       | Correct document references in section 2.2  |         |
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### 1 Scope

This document describes the set of Cold Functional Tests (CFTs) to be performed on the SPIRE FM Instrument for IST Instrument Commissioning (refs. AD6 & AD9) in Hell conditions or as a standalone test in He1 conditions.

It also includes the SMEC Functional & Microvibration Tests. However, these have to be run independently of the other parts of the CFT, as they require a very specific test and satellite configuration and will be run in Hel conditions

Both redundancies are tested within this procedure.

#### **Constraints General**

- This procedure requires the presence of SPIRE personnel as the I-EGSE will be required to assess the results online as part of the pass/fail criteria.
- Before carrying out the next procedure within the test sequence always ask for the go ahead by the SPIRE staff.

### **Constraints Specific**

- Specific constraints apply if Launch Lock Latch status monitoring EGSE is fitted, see section 5.4.3.
- The CFT part of the procedure run as part of SPIRE IST Commissioning shall only be performed in Hell conditions
- The CFT part run standalone can be performed in He1 conditions
- The **SMEC** part of the procedure **shall** only be performed in Hel conditions, with satellite Horizontal with +Y axis up, and a recommended Cryostat fill level at < 50%.
- SMEC Microvibration tests shall be performed with minimal external acoustic noise/vibration (e.g. at night)
- For SMEC Functional tests:
  - Level 1 temperature between 10 K and 20 K with a stability of ca. 2 K is tolerable, since the encoder is less sensitive as it gets warmer
  - o For Level 0 and Level 2 section 5.2 applies

#### 1.1 Objective

The objective of the test is to functionally check the FM instrument as much as feasibly possible in Hel or Hell conditions and in an AIT environment.

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#### 1.2 Test Flow

#### The CFT flow is as follows:

- 1. Power on and configure SPIRE I-EGSE for test
- 2. Power on and configure SVM for IST Instrument Commissioning (IST START)
- 3. Power on NOMINAL SPIRE Prime DPU & DRCU and enable Mil1553B-bus interface
- 4. Run Nominal CFT Procedures
- 5. Power off MCU Prime
- 6. Disable Mil1553B-bus interface and Power off SPIRE Prime DRCU & DPU
- 7. Repeat Steps 3 6 for Spire Redundant CFT Procedures
- 8. Power off SVM including CCU (IST END)
- 9. Switch off all EGSE

#### The SMEC flow is as follows:

- 1. Power on and configure SPIRE I-EGSE for test
- 2. Power on and configure SVM for test including CCU
- 3. Power on NOMINAL SPIRE Prime DPU & DRCU and enable Mil1553B-bus interface
- 4. Run SMEC CFT Nominal Procedures
- 5. Run SMEC Microvibration Procedures (on Nominal only)
- 6. Power off MCU Prime
- Disable Mil1553B-bus interface and Power off SPIRE Prime DRCU & DPU
- 8. Repeat Steps 3, 4, 6 & 7 for Spire Redundant SMEC CFT Procedures
- 9. Power off SVM including CCU
- 10. Switch off all EGSE

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# 2 Documents/Drawings

### 2.1 Applicable Documents

| AD 1  | FM SPIRE PFM Final Electrical Integration Procedure   | HP-2-ASED-TP-0166        |
|-------|---|--------------------------|
| AD 2  | Herschel PCDU & CDMS Nominal Switch On/Off Procedure  | HP-2-ASED-PR-0070        |
| AD 3  | Herschel SAT Emergency Switch Off Procedure   | HP-2-ASED-PR-0071        |
| AD 4  | PA Plan   | HP-2-ASED-PL-0007        |
| AD 5  | I-EGSE Switch ON/OFF Procedure  | ТВІ                      |
| AD 6  | Test Specification for Herschel Instrument AVM & FM Tests Performed at Satellite Level, Issue 2 | H-P-2-ASP-TS-1083        |
| AD 7  | H-P GDIR  | H-P-1-ASPI-SP-0027       |
| AD 8  | SPIRE I-EGSE Set-Up, Issue 2.2  | SPIRE-RAL-DOC-<br>002841 |
| AD 9  | Herschel Integrated Satellite Test<br>Specification, Issue 6                                    | H-P-2-ASP-SP-0939        |
| AD 10 | Herschel IST Lead Procedure   | HP-2-ASED-TP-0134        |
| AD11  | SPIRE SMEC Launch Lock Status EGSE, issue 3.0   | SPIRE-RAL-NOT-003015     |
| AD12  | S/C Configuration for IST Instrument<br>Commissioning, Issue 1                                  | HP-2-ASED-TP-0237        |

### 2.2 Reference Documents

| RD 1 | System User Manual                              | H-P-4-TE-MA-0010   |
|------|---|--------------------|
| RD 2 | SPIRE Cold Functional Test Procedures, Iss. 2.6 | SPIRE-RAL-PRC-2398 |
| RD 3 | Herschel CDMU ASW S/W Interface                 | H-P-4-SSF-IC-0001  |

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|      | Control Document   |                                  |
|------|--|----------------------------------|
| RD 4 | Herschel CDMU BSW S/W Interface Control Document         | H-P-4-SES-NT-0076                |
| RD 5 | SPIRE IID-B  | SCI-PT-IIDB/SPIRE-02124          |
| RD 6 | SPIRE Functional Test Specification Iss. 1.4             | SPIRE-RAL-DOC-001652             |
| RD 7 | SPIRE Instrument User Manual Iss. 1.4                    | SPIRE-RAL-PRJ-002395             |
| RD 8 | H/P OBT-UTC Time Synchronisation Technical Note Iss. 1.3 | PT-CMOC-OPS-TN-6604-<br>OPS- OGH |
| RD 9 | SPIRE IST SPT Procedure; Iss 3.4                         | SPIRE-RAL-PRC-2704               |

### 2.3 Other Documents

### None

# 2.4 Acronyms & Abbreviations

| 1553  | MIL-STD-1553B conform communication interface |
|-------|---|
| AAD   | Attitude Anomaly Detector                     |
| ACC   | ACMS Control Computer                         |
| ACMS  | Attitude Control and Measurement Subsystem    |
| AD    | Applicable Document                           |
| AIR   | ACC In Reconfiguration                        |
| AIT   | Assembly, Integration and Test                |
| AIV   | Assembly, Integration and Verification        |
| APID  | Application Process ID                        |
| ASW   | Application Software                          |
| AVM   | Avionics Model                                |
| BOLC  | BOLometer Control unit (PACS)                 |
| BSW   | Basic Software                                |
| СВН   | Catalyst Bed Heater                           |
| CCS   | Central Check-out System                      |
| CCSDS | Consultative Committee for Space Data Systems |
| CDMU  | Control and Data Management Unit              |
| CDMS  | Control and Data Management Sub-system        |

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CFT Cold Functional Test

CIR CDMU In Reconfiguration

CLCW Command Link Control Word

CLTU Command Link Transmission Unit

CPDU Command Pulse Distribution Unit

CRS Coarse Rate Sensor

CTR Central on board Reference Time

DCU Detector Control Unit (SPIRE)

DEC Detectors Electronics Control unit (PACS)

DMC Detector and Mechanism Control unit (PACS)

DPU Digital Processing Unit

DRCU Detector Readout & Control Unit (SPIRE)

**EEPROM** Electrically Erasable PROM

EGSE Electrical Ground Support Equipment

FCL Fold-back Current Limiter

FCU FPU Control Unit (Spire)

FCV Flow Control Valves

FDIR Failure Detection, Isolation, and Recovery

FPU Focal Plane Unit

GDIR General Design and Interface Requirement

GRP Group Heaters Switch

HBR High Bit Rate

HL/HLC High Level command

HP/HPC High Priority commands

HPLM Herschel PayLoad Module

HPSDB Herschel Planck System Data Base

HW Hardware

i.a.w. In accordance with

I/F InterFace

I/O Input/Output

ICD Interface Control Document

IST Integrated System Test

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LCL Latching Current Limiter

LV Latching Valves

LBR Low Bit Rate

MAP Multiplexed Access Point

MBR Medium Bit Rate

MCU Mechanisms Control Unit (SPIRE)

MEC Mechanisms Electronics Control unit (PACS)

ML 16 Memory Load command (ML 16)

MM Memory Module

MOIS Mission Operations Information System

MTL Mission Timeline

NRZ-L Non Return to Zero – Litton

OBCP On-Board Control Procedure

OBDH On-Board Data Handling

OBMF On-Board Monitoring Function

OBRT/OBT On-Board Reference Time

OIRD Operation Interface Requirement Document

PACS Photodetector Array Camera & Spectrometer

P/L Payload

PCDU/PCS Power Control Distribution Unit/Power Control Subsystem

PM Processor Module

PROM Programmable Read Only Memory

PSK Phase Shift Keying

RA Rate Anomaly

RAM Random Access Memory

RCS Reaction Control Subsystem

RD Reference Document

RF Radio Frequency

RM Reconfiguration Module

RT 1553 Remote Terminal

RTU RT Unit

RTA RTU

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RWL Reaction Wheel Assembly

SA 1553 Remote Terminal Sub Address

SAS Sun Acquisition Sensor

SCOE Special Check-out Equipment

SCU Subsytems Control Unit (SPIRE)

SIR S/C In Reconfiguration

SIT Subsystem Integrated Test

SP Sun Pointing

SPIRE Spectral & Photometric Imaging Receiver

SPU Signal Processing Unit (PACS)

SSMM Solid State Mass Memory

STR Star Tracker

SVM Service Module

SW Software

TAI International Atomic Time

TC TeleCommand

TFG Transfer Frame Generator

TM TeleMetry

TTC Telemetry Tracking & Command subsystem

TTR Telemetry Telecommand and Reconfiguration

UFT Unit Functional Test

VC Virtual Channel

WD Watchdog

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### 3 Configuration

### 3.1 Satellite Configuration

The test requires use of the FM SVM powered on including the CCU (connected to cryostat temperature and pressure sensors). Note this also means that the cryostat valves (commandable from the CCS) may also be connected therefore this has to be considered as a SAFETY critical area to be addressed in section 5.

For the CFT in Hell the satellite configuration will be as per the IST SPIRE Commissioning Configuration ref. AD10.

For the CFT in He1 after shipping to CSG, French Guiana the S/C will be powered on in a minimum configuration i.a.w. AD2.

For SMEC parts of the CFT a minimum SVM configuration can be used as per AD2.

The Cryostat and therefore the satellite must be horizontal (+Y axis up) to perform the SMEC parts (section 7.2.6) of the CFT.

SPIRE FM units will be powered ON as per this procedure and assumes that FPU has already been successfully integrated to the warm units.

### 3.2 EGSE Configuration

This test requires the EGSE to be configured and elements powered on in accordance with AD 2.

I-EGSE shall be configured and connected to the HPCCS in accordance with AD 5 & AD 8.

#### 3.3 Set-up

SPIRE Test Scripts for the test must be loaded on to the HPCCS and checked in prior to start of test.

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# 4 Test Sequence

Ensure that the latest delivery of SPIRE CFT & SPT test scripts are installed on the CCS prior to start of test.

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The SPIRE I-EGSE will be running the following software for the test:

| I-EGSE Software   | Version | Comment |
|-------------------|---------|---------|
| SPIRE MIB version |         |         |
| SPIRE CUS version |         |         |
| SCOS version      |         |         |

The HPCSS HPSDB must also include the same SPIRE MIB version.

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### 5 Conditions

### 5.1 Personnel

| Responsibility            | Name / Organisation  |
|---------------------------|----------------------|
| Test Director             | B. COLLANDIN TAS-F   |
| Test Conductor            | S. HAMER LASED       |
| EGSE Operator             | S. WAMBELLASED       |
| PA Responsible            | 3. RAUTAKOSKI/ESA    |
| Instrument Representative | B. SWINYARD/RAL      |
| Customer Representative   | B. COLLAWDIN (TAS-F) |
| ESA Representative        | C. SCHARMBERG        |

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### 5.2 Environmental

The actual clean room and spacecraft environmental conditions for the test shall be recorded below.

| Clean Room Conditions | Nominal                | Actual |
|-----------------------|------------------------|--------|
| Clean Room Class      | class 100000 or better |        |
| Temperature           | 22°C ± 3°C             |        |
| Rel. Humidity         | 40 % - 60 %            |        |
| Pressure              | Ambient                |        |

| S/C Environmental                    | Required  | Actual |
|--------------------------------------|---|--------|
| S/C Orientation                      | CFT: 20deg from Z, +Y<br>down<br>CFT-CSG: Vertical<br>SMEC: Horizontal, +Y up |        |
| Cryostat Status (Hel/Hell)           | CFT: Hell<br>CFT-CSG/SMEC: Hel  |        |
| Cryostat Level 0 Temp                | CFT: T < 2.0K<br>CFT-CSG/SMEC: 4.2K < T<br>< 6.5K                             |        |
| Cryostat Level 1 Temp<br>(T235-T236) | CFT: T < 6.2K<br>CFT-CSG/SMEC: 10K < T<br>< 20K **                            |        |
| Cryostat Level 2 Temp                | CFT: T < 12K<br>CFT-CSG/SMEC: 5K < T <<br>30K                                 |        |
| Cryostat Level 3 Temp                | CFT-CSG/CFT: 5K < T <<br>50K<br>SMEC: N/A                                     |        |

<sup>\*\*</sup> Stability of 2K/test period (ref. HP-2-ASED-MN-1528 10/04/08)

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### 5.3 General Precautions and Safety

Non-test specific precautions and safety considerations are detailed in section 5.3 of AD 2. Specific safety issues and general precautions for the tests to be performed are detailed in the following sections.

### 5.3.1 General Safety Requirements, Precautions

In the event of unrecoverable anomaly requiring emergency switch off of the satellite, the switch off shall be performed in accordance with AD 3.

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#### 5.3.2 ESD constraints

Normal ESD constraints are to be observed during the test.

### 5.3.3 Cryo Specific Safety Requirements

During the test the CCU may be connected to the Cryostat sensors and valves. Although no valve operation is performed in this test all Cryogenic specific safety requirements shall be considered when running this procedure as indicated below.

Safety instruction for cryogenic hazards coming from the Helium system are as follows:

| 1 | Helium itself is a non-toxic gas. The hazards to be expected are personal injuries from frostbites (cold surfaces, cold gas plumes), asphyxiation due to insufficient oxygen in the remaining air, loss of orientation due to dense fog generation and impacts of cold damaged structures.  |  |  |  |
|---|---|--|--|--|
|   | Due to the amount of stored energy the Herschel cryostat is a pressure vessel and the general rules for pressure vessel design have to be followed. In addition to these general rules, the safety regulations at CSG launch site have to be considered. The application of these rules leads to a safety concept, which is based on the 'leak before burst' criterion. Herschel is based on the following safety and reliability philosophy: |  |  |  |
|   | a. Two failure tolerant   |  |  |  |
| 2 | b. Three independent paths for overpressure relief  |  |  |  |
|   | <ul> <li>c. Passive safety system for all operation modes (no active controls for<br/>monitoring is required at any time)</li> </ul>  |  |  |  |
|   | As emergency situations may occur at unexpected points in time and typically need immediate action, the full hierarchy of the project cannot be deployed and consultation of all knowledgeable persons may not be possible.   |  |  |  |
|   | The main intent of immediate actions will therefore be to ensure safety of personnel and to bring the S/C into a safe waiting condition. The priority of safeguarding is  |  |  |  |
|   | 1) Personnel  |  |  |  |
| 3 | 2) S/C  |  |  |  |
| 3 | 3) Facility   |  |  |  |
|   | 4) Support equipment  |  |  |  |
|   | The second aim is to keep the cryostat near the foreseen test conditions in order to continue the test without unnecessary time delay if the failure can be corrected.  |  |  |  |
| 4 | The ASED test director (or his representative) will be informed by the test personnel of any non-conformances, alarm and unforeseen events that might lead to emergency situations. The ASED test director (or his representative) will initiate immediate steps and call the decision committee (ASED test director, ASED PA, ESA test director,   |  |  |  |
|   | ASP representative, ETS representative) if necessary.   |  |  |  |

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| 5 | Prior to begin a pre-task briefing shall be performed to inform all participants about purpose of operation, possible hazards and emergency shut down |  |  |  |
|---|---|--|--|--|
|   | In case of operation of the Cryostat safety system the following IMMEDIATE activities shall be performed:   |  |  |  |
| 6 | Operation of the safety valve: EVERYBODY has to leave the test room,<br>except test Conductor and necessary CVSE operations personnel                 |  |  |  |
|   | Operation of burst disc: EVERYBODY has to leave the test room   |  |  |  |

### 5.3.4 Special QA Requirements

None.

#### 5.4 **GSE**

Non-test specific GSE details are provided in section 5.4 of AD 2. Specific GSE needs for the tests to performed are detailed in the following sections.

#### 5.4.1 MGSE

None.

### 5.4.2 CVSE

None.

### 5.4.3 EGSE

The I-EGSE is required for this test and will be connected to the HPCCS in accordance with AD 5.

For SMEC tests the Launch Lock latch monitoring EGSE maybe fitted to the S/C according to AD11.

#### 5.4.4 OGSE

None.

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### 5.4.5 Special Equipment

None.

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### 6 Verification Requirements and Test Criteria

This is a functional check of all SPIRE PFM subsystems in Hel or Hell conditions and AIT configuration as per AD6 and AD9.

Functional performance and status parameter actual values recorded will be checked during the test and must be the same as the nominal status value indicated.

The test will only be deemed successful once all offline analysis of the results has been performed. Typically, the PTR will be held before completion of this activity and therefore only a preliminary assessment of the test success can be provided to allow disconnection of any specific GSE required for the test and which needs to be removed before further activities can be performed.

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- 7 **Test Procedure**
- 7.1 Initial EGSE and Satellite Configuration for the Test

The Spire FM Final Integration according to the Test Procedure ref. AD 1 must be successfully completed before the execution of this procedure.

The EGSE and Satellite must be configured according to AD 2 prior to start of test.

In case of anomaly on SPIRE requiring immediate switch off as directed by SPIRE responsible supporting the test section 7.2.8 shall be executed.

In the event of emergency the Satellite SHALL be switched down according to AD 3.

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### 7.2 Step by Step Procedure

| Test Location:    | CSQ SAB   |
|-------------------|---|
| Test Session Id:  | 2009-02-26-22_55-Rendum-aprise1_ REALTIME - SPIME-SFT |
| Test Environment: | NP_2_ASEO_TP_OR17-M2-SPIRE_COLD_END_CO1               |

### 7.2.1 EGSE & Satellite Switch On for CFT

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks   | Р | N |
|--------------|---|------------------|-----------|-----------------|-----------|---|---|
|              | Satellite & EGSE Switch On  |                  |           |                 |           |   |   |
| 0            | Confirm all constraints for the CFT as defined in Section 1 have been fulfilled prior to starting the test  | ОК               |           | de              |           | V |   |
| 1            | Confirm I-EGSE physically connected to HPCCS  | ок               |           | OK              |           | V |   |
| 2            | Switch on & configure SPIRE I-EGSE i.a.w. AD5 & AD 8  | ок               |           | OK              |           | ~ |   |
| 3            | Confirm SPIRE I-EGSE is in the correct configuration as per AD5 & AD 8 and TIME synchronised with HPCCS   | ОК               | time      | 2+nc ()         | eded Cata | > |   |
| 4a           | If test is perform as part of SPIRE IST Commissioning then switch on HPCCS, SCOEs and Satellite/SVM i.a.w. AD 10 sections 7.1 and 7.2. In section 7.2.4 selecting the test case SPIRE Commissioning | ОК               |           | N/A             |           | V |   |

|          |                   |       | •         | ^   | 100              |     |
|----------|-------------------|-------|-----------|-----|------------------|-----|
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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value       | Tolerance | Actual<br>Value | Remarks         | Р  | N  |
|--------------|--|------------------------|-----------|-----------------|-----------------|--|----|
|              | 5.8.4.5.1, in the Master GUI   | 7 3.143                |           | Value           |                 | +  | ├─ |
| 4b           | If test is to be performed as a standalone CFT then switch on HPCCS, SCOEs and S/C and configure into Basic Test Mode, with SSMM/Packet Stores initialised and CCU monitoring set to Mode 2 i.a.w. AD2 section 7.5 | ОК                     |           | ok              |                 | V  |    |
| 5            | Only if performing SPIRE IST Commissioning, configure the Satellite specifically i.a.w. with AD12 Section 7.2 continuing up to step 41   | ОК                     |           | N/A             |                 | \  |    |
| 6            | Only if performing SPIRE IST Commissioning confirm that EGSE and Satellite are in the correct configuration as per AD 10   | ОК                     |           | N/A             |                 | V  |    |
| 7            | Connect HPCCS to CRYOSCOE and verify CryoSCOE data is being received on the CCS by executing the following script:  K102999ECVT035_ASDGEN_SCOE_CCU_LOG   | OK                     |           | OK              | Stopped CCU leg | ~  |    |
| 8            | From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE   |                        |           | CV.             |                 | \ \sigma   |    |
| 9            | Confirm from LIBOON LODING LODING LODING   |                        |           |                 |                 |  | 1  |
|              | Confirm from HPCCS and SPIRE I-EGSE that the connection has been established   | YZS29940=<br>CONNECTED |           | Connected       | AND SYS_PARS    | V  |    |
| 10           | Verify that I-EGSE is receiving CCU Cryo packets   | OK                     |           |                 |                 |  |    |
| 11           | On HPCCS start the following test script:  |                        |           |                 |                 | -  |    |
|              | SPIRE_ALL_SubscribeParams  | ОК                     |           | 01-             |                 | $\vee$   |    |
| 12           | Verify correct connection and time synchronisation with IEGSE:   | OK                     |           | Ø.              | time spec on    | \rightarrow \right |    |
|              | Y102999ETVT036_ASDGEN_VERSPIREIEGSE  |                        |           |                 | •               |  |    |
| 13           | If required load Synoptics INSTRUMENTS on HPCCS to display   | OK                     |           | OL              |                 |  |    |

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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks | Р | N |
|--------------|---|------------------|-----------|-----------------|---------|---|---|
|              | SPIRE status overview   |                  |           |                 |         |   |   |
| 14           | If not running already, start the instrument temperature logging: | ОК               |           | or              |         | ~ |   |
|              | Z102999SCVT025_ASDGEN_INSTTEMP_LOG                                |                  |           |                 |         |   |   |
|              | READY FOR START OF SPIRE CFT                                      |                  |           |                 |         |   |   |

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#### **Test Procedure**

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7.2.2 Cold Functional Tests - Nominal

### 7.2.2.1 Switch ON SPIRE PRIME

The following will switch ON and configure SPIRE Prime instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1280 and 1282 decimal (these can be observed using TMPH with corresponding filter – note however a limited number of TMPHs should be running at one time).

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE is in REDY mode. When in REDY mode one parameter remains OOL (soft) namely SMD2V505 this is also expected.

| Step-N | lo. | Test-Step-Description   | Nominal Value | Actual Value | Remarks  | Р | N |   |
|--------|-----|---|---------------|--------------|--|---|---|---|
| 1.     |     | On HPCCS start Packet History displays for the following APIDs:1280,1282  | ок            | ON.          |  | ~ |   | ; |
| 2.     |     | From the HPCCS test conductor console start the test script to power on SPIRE Prime: S102999SCVT031_ASDCFTSPIR_PWR_ON_P | I ( )K        | oh           | AND: ZAD07999,<br>ZAD14999<br>MIM:<br>LCL HERSCHEL | ✓ |   |   |

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| Step-No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks       | Р | N |
|----------|---|---------------|--------------|---------------|---|---|
| 3.       | On HPCCS when prompted:  "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"   | YES           | YES          |               | V |   |
|          | Select YES  If YES is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below. |               | on           |               | ✓ |   |
| 4.       | On HPCCS when prompted:  "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue"  Select OK   | ок            | OV           | AND: SA_1_559 | J |   |

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| Step- | No. | Test-Step-Description  | Nominal Value                            | Actual Value | Remarks  | Р | N |
|-------|-----|--|--|--------------|--|---|---|
| 5     |     | If I-EGSE connected when prompted on HPCCS, perform check requested then select OK:  "Check IEGSE Time Consistent - OK to continue when RAL confirm" | ОК                                       | ok           |  | ~ |   |
| 6.    |     |  | Not refreshing Not incrementing OK       | Not repudy   | Note: Two TC<br>failures on<br>SCR00500 are<br>expected<br>because HKTM<br>has been<br>stopped | ~ |   |
| 7.    |     | On HPCCS when prompted:  "Check Telemetry Updating Correctly - OK to continue"  Check that parameters:  THSK TM2N                                    | Refreshing @ 1Hz Incrementing by 1 @ 1Hz |              | AND: SA_1_559  | ~ |   |

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| Ste | o-No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks | Р | N |
|-----|-------|---|---------------|--------------|---------|---|---|
|     |       | Select OK to continue   | ок            | OV~          |         | V |   |
|     | 8.    | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT031_ASDCFTSPIR_PWR_ON_P it will prompt:  "Set Bus Profile Back to Original Setting?" Select NO | NO            | No           |         | > |   |
|     | 9.    | At the prompt:  "Bus Profile left unchanged"  Select OK to continue   | ок            | or           |         | > |   |
|     | 10.   | Verify HK TM packets are being received on APIDs 1280 & 1282  | ок            | on           |         | ✓ |   |
|     |       | SPIRE DPU & DRCU powered  |               |              |         |   |   |

|                            |       | <del>`</del> ` |    |           | /             |
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# 7.2.2.2 Procedure SPIRE-IST-COLD-FUNC-SCU-02-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | SCU Nominal Science Contents Check PRIME   |
| Initial configuration | SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced   |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE-IST-COLD-DPU-ON-P and SPIRE-IST-COLD-DRCU-ON-P procedures have been executed.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>I-EGSE is up and running</li> <li>DPU AND OBS PARAMETERS &amp; FUNCTIONAL TEST PARAMETERS displays are selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | HK parameters have the expected values   |

### **Procedure Steps:**

| Step | Description   | Parameter           | Expected<br>Values Before/<br>After | Actual<br>Values<br>Before<br>/After | Success/<br>Failure |
|------|---|---------------------|-------------------------------------|--------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-02-P.tcl | SCUFRAMECNT<br>TM5N | 0/31<br>0x3FFF/1                    | 0/3),<br>0xsff/1                     |                     |

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### 7.2.2.3 Procedure SPIRE-IST-COLD-FUNC-SCU-03-P

| Version                        | 2.4   |
|--------------------------------|---|
| Date                           | 6th December 2007   |
| Purpose                        | SCU DC thermometry check  |
| Initial configuration          | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced  |
| Final configuration            | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON   |
| Constraints                    | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration<br>Pass/Fail Criteria | 8 minutes SCU DC thermometry channels show temperature readings according to the actual instrument temperature  |

### Procedure Steps:

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-<br>COLD-FUNC-SCU-03-P.tcl | _                | _                                     | _                                   | 010                 |
| 2    | Wait for the parameter BBFULLTYPE to get set to         | _                | _                                     | _                                   | OK.                 |

|          |                   |       |           | 10      |            |      | 20  | _ |
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| Step | Description  | Parameter - Unit   | Expected Values Before/ During/ After  | Actual Values Before/ During/ After     | Success/<br>Failure |
|------|--|--|--|---|---------------------|
| 3    | A few seconds later record the value of parameter SCUTEMPSTAT                              | SCUTEMPSTAT  | 0/0xFFFF/0xFFFF  | 0×ek t                                  | OK                  |
| 4    | If the instrument is at He I temperatures check the values of SCU DC thermometry channels. | PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SLOTEMP PLOTEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP BSMTEMP | (All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.8K ~4.8K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K | 151717171717171717171717171717171717171 | OK                  |
| 5    | If the instrument is at He II temperatures check the values of                             | PUMPHTRTEMP  | (All Values TBC)<br>-/~4.6K  | ,                                       |                     |

| Cata a C | )-4- <b>(T</b> :   (2,0) | T     |           |      | -(a)  | <b>/</b> ) | 4 |    |
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| Step      | Description                    | Parameter - Unit | Expected Values | Actual  | Success/ |
|-----------|--------------------------------|------------------|-----------------|---------|----------|
|           |                                |                  | Before/         | Values  | Failure  |
|           |                                |                  | During/         | Before/ |          |
|           |                                |                  | After           | During/ |          |
|           |                                |                  |                 | After   |          |
|           | SCU DC thermometry channels.   | PUMPHSTEMP       | -/~3.0K         |         |          |
|           |                                | EVAPHSTEMP       | -/~3.0K         |         |          |
|           |                                | SHUNTTEMP        | -/~1.7K         | ·       |          |
|           |                                | EMCFILTEMP       | -/~4.6K         |         |          |
|           |                                | SL0TEMP          | -/~1.7K         |         |          |
|           |                                | PL0TEMP          | -/~1.7K         |         | (        |
|           |                                | OPTTEMP          | -/~4.6K         |         |          |
|           |                                | BAFTEMP          | -/~4.6K         | N (A    | 11/14    |
|           |                                | BSMIFTEMP        | -/~4.5K         | , , ,   |          |
|           |                                | SCAL2TEMP        | -/~4.6K         |         |          |
|           |                                | SCAL4TEMP        | -/~4.6K         |         |          |
|           |                                | SCALTEMP         | -/~4.6K         |         |          |
|           |                                | SMECIFTEMP       | -/~4.6K         |         |          |
|           |                                | SMECTEMP         | -/~4.6K         |         |          |
|           |                                | BSMTEMP          | -/~4.5K         |         |          |
| 6         | Wait for the I-EGSE staff to   | _                |                 | _       |          |
|           | confirm the success or failure |                  |                 |         | Ox       |
|           | of this test                   |                  |                 |         |          |
| Test Resu | ılt (Pass/Fail):               |                  |                 | •       |          |

|          |               |          |       |           |     | 100          | _   |                |  |
|----------|---------------|----------|-------|-----------|-----|--------------|-----|----------------|--|
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## 7.2.2.4 Procedure SPIRE-IST-COLD-FUNC-SCU-06-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU AC thermometry check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON                       |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON                    |
| Constraints           | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> </ul> |
|                       | CCS is up and running   |
| Duration              | FUNCTIONAL TEST PARAMETERS display is selected on the CCS   |
| Duration              | 2 minutes   |
| Pass/Fail Criteria    | SCU AC thermometry channel shows temperature readings according to the actual instrument temperature          |

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### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-<br>SCU-06-P.tcl                                   | _                | _                                     | _                                   | OX                  |
| 2    | Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm                              | _                | _                                     | _                                   | OL                  |
| 3    | A few seconds later record the value of parameter SUBKSTAT                                | SUBKSTAT         | 0/1/1                                 | ω <i>(</i> ,                        | OK                  |
| 4    | If the instrument is at He I temperatures check the value of SCU AC thermometry channel.  | SUBKTEMP         | ~4K                                   | 5.6                                 | OK                  |
| 5    | If the instrument is at He II temperatures check the value of SCU AC thermometry channel. | SUBKTEMP         | ~1.7K                                 | NIA                                 | NIA                 |
| 6    | Wait for the I-EGSE staff to confirm the success or failure of this test                  | _                | _                                     | _                                   |                     |

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## 7.2.2.5 Procedure SPIRE-IST-COLD-FUNC-SCU-07-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Sorption Cooler Heater Check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Constraints           | This test should not be performed at He II temperatures, unless specifically instructed to do so by the I-EGSE staff.   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail Criteria    | Sorption cooler heat switches and pump heater show expected voltages  |

**Procedure Steps:** 

| Step | Descripti n  | Parameter – Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|--|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-07-P.tcl            | _                | _                                     | _   | OK                  |
| 2    | Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk | BBFULLTYPE       | Cooler_Htr_Chk                        |   |                     |

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| Step | Description  | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|--|------------------|---------------------------------------|-------------------------------------|---------------------|
| 3    | Record the value of parameter SPHSV – the Sorption Pump Heat Switch Voltage.  This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue. | SPHSV - mV       | 0/~323/0                              | 324.18                              | OK                  |
| 4    | Record the value of parameter  EVHSV – the Evaporator Heat Switch Voltage.  This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.   | EVHSV - mV       | 0/~323/0                              | 324.02                              | ΟK                  |
| 5    | Record the value of parameter SPHTRV – the Sorption Pump Heater Voltage.  This voltage stays on for ~20 seconds.Wait for the voltage to go to zero to continue.      | SPHTRV – V       | 0/~8.8/0                              | 8.85V                               | Ole                 |
| 6    | Wait for the I-EGSE staff to confirm the success or failure of this test   | _                | _                                     | _                                   | OK                  |

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## 7.2.2.6 Procedure SPIRE-IST-COLD-FUNC-PCAL-01-P

| Version               | 1.0  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | PCAL Characterisation Check (PRIME)                              |
| Initial configuration |  |
| Final configuration   | Unchanged  |
| Constraints           | This test should only be performed at He I or He II temperatures |
| Preconditions         |  |
| Duration              | 5 minutes  |
| Pass/Fail Criteria    | PCAL voltage and current agree with expected values              |

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**Procedure Steps:** 

| Step   | Description  | Parameter Name – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|--------|--|-----------------------|---------------------------------------|-------------------------------------|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-FUNC-PCAL-01-P.tcl                     | _                     | _                                     | _                                   | OK.                 |
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                     | _                                     | _                                   | OK                  |
| Test R | esult (Pass/Fail):   |                       |                                       |                                     |                     |

Final Configuration: Unchanged

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## 7.2.2.7 Procedure SPIRE-IST-COLD-FUNC-SCAL-01-P

| Version               | 1.0  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | SCAL Characterisation Check (PRIME)  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON       |
| Final configuration   | Unchanged  |
| Constraints           | This test should only be performed at He I or He II temperatures.                                |
|                       | If the test is to be performed at He II temperature then please confirm with I-EGSE staff first. |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS  |
| Duration              | 18 minutes   |
| Pass/Fail criteria    | SCAL2 and SCAL4 voltage and currents agree with expected values                                  |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCAL-01-P.tcl                     | _                | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | 016                 |

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### 7.2.2.8 Procedure SPIRE-IST-COLD-FUNC-MCU-01-P

| Version                    | 2.4  |
|----------------------------|--|
| Paragraph same was as Date | 6th December 2007  |
| Purpose                    | MCU (PRIME) Boot Check   |
| Initial configuration      | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON     |
| Final configuration        | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                            | MCU PRIME is booted.   |
| Preconditions              | SPIRE DRCU PRIME is switched ON  |
|                            | SPIRE MIB PRIME is imported in the CCS database.   |
|                            | CCS is up and running  |
|                            | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration                   | 5 minutes  |
| Pass/Fail criteria         | MCU voltages and board temperatures show expected 'ON' values                                  |

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### Procedure Steps:

| Step | Description   | Parameter – Unit                                   | Expected Values Before/ During/ After  | Actual Values Before/ During/ After        | Success/<br>Failure |
|------|---|--|--|--|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-01-P.tcl                     | _  | _  | _  | OK                  |
| 2    | Check that the MCU is booted up successfully                            | MCUBITSTAT   | 0/1/1  | 1  | OK                  |
| 3    | Check MCU HK parameter values and ensure that the values are refreshing | MCUP5V<br>MCUP14V<br>MCUM14V<br>MCUP15V<br>MCUM15V | ~ $5.0 \pm 0.2V$<br>~ $14.0 \pm 0.5V$<br>~ $-14.0 \pm 0.5V$<br>~ $15.0 \pm 0.5V$<br>~ $-15.0 \pm 0.5V$ | 5.01<br>14.15<br>-14.47<br>15.55<br>-15.63 | OK                  |
|      | esult (Pass/Fail):  | MCUMACTEMP<br>MCUSMECTEMP<br>MCUBSMTEMP            | ~300K<br>~300K<br>~300K  | 294,44<br>299,43<br>298,92                 |                     |

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Test Result (Pass/Fail):

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### 7.2.2.9 Procedure SPIRE-IST-COLD-FUNC-MCU-03-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU Nominal Science Contents Check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.   |
| Final configuration   | Unchanged.  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified MCU HK parameters show expected increment   |

### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-03-P.tcl | MCUFRAMECNT      | 0/-/297                               | 0(297   | OK                  |

|            |               |        |    |      |   |           |   | Ì |   |   |   | 1    | 7   |   |
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### 7.2.2.10 Procedure SPIRE-IST-COLD-FUNC-BSM-01-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (PRIME) Chop/Jiggle Sensor Check.   |
| Initial configuration |   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              |   |
| Pass/Fail criteria    | HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected ON values.  |

### **Procedure Steps:**

| Step | Description   | Parameter – Unit           | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|----------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-01-P.tcl     | _                          | _                                   |                                   | OK                  |
| 2    | Check that the Chop and Jiggle sensors have switched on | CHOPSENSPWR<br>JIGGSENSPWR | 0/1/1                               | 1                                 | OK.                 |

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### 7.2.2.11 Procedure SPIRE-IST-COLD-FUNC-BSM-03-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (PRIME) Open Loop Dynamics Check.   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and  |
| e e districi picalia  | MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.  |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | CHOPSENSSIG/JIGGSENSIG HK parameter evolve in the same direction as the commanded positions   |

### **Procedure Steps:**

|  | cute TCL script SPIRE-IST-COLD-FUNC-                               |   |   | · | ļ . |
|--|--|---|---|---|-----|
|  | 1-03-P.tcl   |   |   | _ | OK  |
|  | t for the I-EGSE staff to confirm the cess or failure of this test | _ | _ | _ | Ole |

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#### 7.2.2.12 Procedure SPIRE-IST-COLD-FUNC-BSM-05A-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | BSM (PRIME) Open Loop Chop Test  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and               |
|                       | MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.   |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> </ul>                      |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | <ul> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | The BSM Chops between the commanded positions  |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05A-P.tcl                     |                  | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |

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### 7.2.2.13 Procedure SPIRE-IST-COLD-FUNC-BSM-05B-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | BSM (PRIME) Close Loop Chop Test   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and   |
|                       | MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.   |
| Final configuration   | BSM is in closed loop mode   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | The BSM Chops in between the commanded positions   |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit             | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-BSM-INIT-P.tcl                                    | CHOPLOOPMODE<br>JIGGLOOPMODE | 3/-/1<br>3/-/1                      |                                   | Ok                  |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05B-P.tcl                     | _ ·                          | _                                   | _                                 | OK                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                            |                                     | _                                 | OK                  |

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## 7.2.2.14 Procedure SPIRE-IST-COLD-FUNC-BSM-06-P

| Version  | 2.4  |
|--|--|
| Date   | 6th December 2007  |
| Purpose  | BSM (PRIME) Closed Loop Operational Mode Chop Test   |
| Initial configuration  | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
| Final configuration  | MCU PRIME is booted. BSM Chop/Jiggle sensors are ON. BSM is in closed loop.                    |
|  | Unchanged  |
| Preconditions  | SPIRE DRCU PRIME is switched ON  |
| Institute and the second secon | SPIRE MCU PRIME is booted.   |
|  | SPIRE MIB PRIME is imported in the CCS database.   |
|  | CCS is up and running  |
|  | CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS                         |
| Duration   | 5 minutes  |
| Pass/Fail criteria   | The BSM Chops between the commanded positions  |

### **Procedure Steps:**

| Step   | Description  | Parameter – Unit             | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--|------------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1      | Execute SPIRE-IST-COLD-BSM-06-P.tcl                                      | CHOPLOOPMODE<br>JIGGLOOPMODE | 1/1/1                               | !                                 | 0                   |
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                            | _                                   | _                                 | OK                  |
| est Re | esult (Pass/Fail):   |                              |                                     |                                   |                     |

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### 7.2.2.15 Procedure SPIRE-IST-COLD-BSM-OFF-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | BSM (PRIME) Switch OFF   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted. BSM Chop/Jiggle sensors are OFF.  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MCU PRIME is booted.   |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected OFF values.                            |

### **Procedure Steps:**

| Step   | Description                                | Parameter – Unit | Expected Values Before/During/After |    | ll Values<br>e/During/After | Success/<br>Failure |
|--------|--|------------------|-------------------------------------|----|-----------------------------|---------------------|
| 1      | Execute SPIRE-IST-COLD-BSM-OFF-P.tcl       |                  | _                                   |    |                             | OK                  |
| 2      | Check that the power to the BSM sensors is | CHOPSENSPWR      | 1/-/0                               | ١, | 0                           | (h. ) z             |
|        | switched off                               | JIGGSENSPWR      | 1/-/0                               | 1  | 0                           | OK                  |
| Test R | esult (Pass/Fail):                         |                  |                                     |    |                             |                     |

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### 7.2.2 16 Procedure SPIRE-IST-COLD-FUNC-SMEC-01-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SMEC (PRIME) Encoder/LVDT Sensor Check.   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              |   |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.   |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual<br>Before | Values<br>/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|------------------|-------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-<br>SMEC-01-P.tcl | _                | _                                   | _                |                         | OK                  |
| 2    | Check that power to the SMEC LED and LVDT                | SMECENCPWR       | 0/-/1                               |                  |                         |                     |
|      | sensor is on   | SMECLVDTPWR      | 0/-/1                               |                  | ١                       | 015                 |

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### 7.2.2.17 Procedure SPIRE-IST-COLD-FUNC-SMEC-03-P

| Version                          | 2.4  |
|----------------------------------|--|
| Date                             | 6th December 2007  |
| Purpose                          | SMEC (PRIME) Encoder Integrity Check.  |
| Initial configuration            | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |
| and all presidents of the latest | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.                                     |
| Final configuration              | Unchanged  |
| Preconditions                    | SPIRE DRCU PRIME is switched ON  |
|                                  | SPIRE MCU PRIME is booted.   |
|                                  | SPIRE MIB PRIME is imported in the CCS database.   |
|                                  | CCS is up and running  |
|                                  | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                  |
| Duration                         | 5 minutes  |
| Pass/Fail criteria               | MCUENGSMECENCSIG1/2 increase as the encoder power is increased                             |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-03-P.tcl                     |                  | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |

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### 7.2.2.18 Procedure SPIRE-IST-COLD-SMEC-OFF-P

| Version  | 2.4  |
|--|--|
| Date   | 6th December 2007  |
| Purpose  | SMEC (PRIME) Switch OFF  |
| Initial configuration  | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
| SERVICE STATE OF THE SERVICE S | MCU PRIME is booted. SMEC Encoder and LVDT are ON.   |
| Final configuration  |  |
| The second secon | MCU PRIME is booted. SMEC Encoder and LVDT are OFF.  |
| Preconditions  | SPIRE DRCU PRIME is switched ON  |
|  | SPIRE MCU PRIME is booted.   |
|  | SPIRE MIB PRIME is imported in the CCS database.   |
|  | CCS is up and running  |
|  | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration   | 3 minutes  |
| Pass/Fail criteria   | HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.                             |

**Procedure Steps:** 

| Step | Description                                 | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/ |
|------|---|------------------|-------------------------------------|-----------------------------------|----------|
| 1    | Execute SPIRE-IST-COLD-SMEC-OFF-P.tcl       | _                |                                     | Delore/During/After               | Failure  |
| 1 1  | Check that the power to the SMEC sensors is | SMECENCPWR       | 1/-/0                               | 1/0                               | <u> </u> |
|      | switched off                                | SMECLVDTPWR      | 1/-/0                               | ( ) 0                             | OK       |

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# 7.2.2.19 Procedure SPIRE-IST-COLD-FUNC-DCU-02-P

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks       | Р  | N |
|--------------|---|------------------|-----------|-----------------|---------------|----|---|
|              | Cryostat Check Procedure for CFT  |                  |           |                 |               |    |   |
| 2            | Prior to performing next step verify that Level 3 temperature is between 5K and 50K (sensors T246 & T247) | ОК               |           | OL              | 0             | 08 |   |
| 3            | Record Temperatures:  T246: (KD223302 if connected to CCU)  T247: (KD223303 if connected to CCU)          | 1                |           | 26.82           | T247<br>T251, | OR |   |
|              | End of Cryostat Check   |                  |           |                 |               |    |   |

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | DCU Nominal Science Contents Check PRIME   |
| Initial configuration | SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced and MCU is booted.  |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE-IST-COLD-DPU-ON-P and SPIRE-IST-COLD-DRCU-ON-P procedures have been executed.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>I-EGSE is up and running</li> <li>DCU PARAMETERS display is selected on the CCS</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | DCU HK parameters increment as expected  |

|            | <u>.</u> .       |       |           | 1 A       | $\longrightarrow$ |   |
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Procedure Steps:

| Step | Description  | Parameter   | Expected<br>Values Before/<br>After | Actual<br>Values<br>Before<br>/After | Success/<br>Failure |
|------|--|-------------|-------------------------------------|--------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-02-P.tcl                      | DCUFRAMECNT | n/n+700                             | 1200/1900                            | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _           | _                                   | _                                    | 01                  |

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# 7.2.2.20 Procedure SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P

| Version               | 2.4 Final Police   |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | Photometer BDAs switch ON check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted and Photometer BDAs are ON.  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration              | 7 minutes  |
| Pass/Fail criteria    | DCU HK parameters show expected values   |

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Procedure Steps:

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| Execute TCL script SPIRE-IST-COLD-<br>FUNC-DCU-11-PHOT-P.tcl Check that the Photometer detectors | _  | _   | Before/During/After —  | Failure  |
|--|--|---|--|--|
| Check that the Photometer detectors  |  |   |  | Olc  |
| and LIAs are switched on   | PSWJFETSTAT<br>PMLWJFETSTAT              | 0/-/0x3F<br>0/-/0x7F  | 3F<br>7F   |  |
|  | PLIABITSTAT PLIAP5V PLIAP9V PLIAM9V      | 1<br>~0/ ~+5.17 ± 0.1V<br>~0/ ~+11.53 ± 0.1V<br>~0/ ~-11.53 ± 0.1V  | 5.23   | OK   |
| Wait for the I-EGSE staff to confirm the success or failure of this test                         | _  | _   | _  | OK   |
|  | Wait for the I-EGSE staff to confirm the | PLIABITSTAT PLIAP5V PLIAP9V PLIAM9V  Wait for the I-EGSE staff to confirm the success or failure of this test | PLIABITSTAT 1 PLIAP5V $\sim 0/ \sim +5.17 \pm 0.1 \text{V}$ PLIAP9V $\sim 0/ \sim +11.53 \pm 0.1 \text{V}$ PLIAM9V $\sim 0/ \sim -11.53 \pm 0.1 \text{V}$ Wait for the I-EGSE staff to confirm the success or failure of this test | PLIABITSTAT 1 PLIAP5V $\sim 0/\sim +5.17\pm 0.1V$ PLIAP9V $\sim 0/\sim +11.53\pm 0.1V$ PLIAM9V $\sim 0/\sim -11.53\pm 0.1V$ Wait for the I-EGSE staff to confirm the success or failure of this test |

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#### Procedure SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P 7.2.2.21

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpos                | Photometer BDAs integrity check   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON                    |
|                       | and MCU PRIME is booted and Photometer BDAs are ON.   |
| Final configuration   | Unchanged   |
| Precondition          | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> </ul> |
|                       | CCS is up and running FUNCTIONAL TEST PARAMETERS display is selected on the CCS                               |
| Duratio               | 15 minutes  |
| Pass/Fail criteri     | DCU HK parameters show expected values  |

#### **Procedure Steps:**

| Step | Description  | Parameter - Unit                           | Expected Values Before/During/After | Actual Values<br>Before/During/After | Success/<br>Failure |
|------|--|--|-------------------------------------|--------------------------------------|---------------------|
| 1    | Check that Photometer LIAs and detectors are switched on                 | PLIABITSTAT<br>PSWJFETSTAT<br>PMLWJFETSTAT | 1<br>0x3F<br>0x7F                   | 34                                   | OK                  |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P.tcl                 | _  | _                                   | _                                    | ok                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _  | _                                   | _                                    | 012                 |

Test Result (Pass/Fail):

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# 7.2.2.22 Procedure SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Photometer BDAs noise level check   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON.  |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Photometer BDA signals show no excess noise   |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that Photometer LIAs and detectors are             | PLIABITSTAT      | 1                                   | 1                                 | l                   |
|      | switched on  | PSWJFETSTAT      | 0x3F                                | 0×36                              |                     |
|      |  | PMLWJFETSTAT     | 0x7F                                | 0x FF                             | OK                  |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P.tcl | _                | _                                   | _                                 | 98                  |
| 3    | Wait for the I-EGSE staff to confirm the                 | _                | _                                   |                                   |                     |
|      | success or failure of this test                          |                  |                                     |                                   | OK                  |

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# 7.2.2.23 Procedure SPIRE-IST-COLD -PHOT-VSS-P

| Version                       | 1.1   |
|-------------------------------|---|
| Date                          | 10 <sup>th</sup> July 2008  |
| Purpose                       | Photometer BDAs Vss Test PRIME  |
| Initial configuration         | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| ESNE Tempor Cuburate v        | and MCU PRIME is booted and Photometer BDAs are ON.   |
| Final configuration Unchanged |   |
| Preconditions                 | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration                      | 40 minutes  |
| Pass/Fail criteria            | Photometer BDA Vss values are optimised   |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit                           | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|--|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that Photometer LIAs and detectors are switched on                 | PLIABITSTAT<br>PSWJFETSTAT<br>PMLWJFETSTAT | 1<br>0x3F<br>0x7F                   | 0x3F<br>0x7F                      | OK                  |
| 2    | Execute TCL script SPIRE-IST-COLD - PHOT-VSS-P.tcl                       | _  | _                                   | _                                 | ak                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _  | _                                   | _                                 | OK                  |

Test Result (Pass/Fail):

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# 7.2.2 24 Procedure SPIRE-IST-COLD-PDET-OFF-P

| Version                            | 2.4   |
|------------------------------------|---|
| Date                               | 6th December 2007   |
| Purpose Photometer BDAs Switch OFF |   |
| Initial configuration              | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON   |
| Final configuration                |   |
| Preconditions                      | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration                           | 3 minutes   |
| Pass/Fail criteria                 | DCU HK parameters show expected values  |

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### **Procedure Steps:**

| Step   | Description  | Parameter - Unit            | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--|-----------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-PDET-OFF-P.tcl                         | _                           | _                                   | _                                 | NOIZ.               |
| 2      | Check that the Photometer detectors are switched off                     | PSWJFETSTAT<br>PMLWJFETSTAT | 0x3F/-/0<br>0x7F/-/0                | 0x3F/0                            | OK                  |
| 3      | Check that the Photometer LIAs are switched off                          | PLIABITSTAT                 | 1/-/0                               | 1/0                               | OK                  |
| 4      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                           | _                                   | _                                 | OIC                 |
| Test F | Result (Pass/Fail):  |                             |                                     |                                   | 1                   |

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#### 7.2.2.25 Procedure SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | Spectrometer BDAs switch ON check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.                              |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON. |
| Preconditions         |  |
| Duration              | 7 minutes  |
| Pass/Fail criteria    | DCU HK parameters show expected values   |

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# **Procedure Steps:**

| Step | Description  | Parameter – Unit              | Expected Values Before/During/After                        | Actual Values Before/During/After | Success/<br>Failure |
|------|--|-------------------------------|--|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P.tcl                 | _                             | _  | _                                 | OK                  |
| 2    | Check that the Spectrometer detectors and LIAs are switched on           | SPECJFETSTAT SLIABITSTAT      | 0/-/7  | 7                                 |                     |
|      |  | SLIAP5V<br>SLIAP9V<br>SLIAM9V | ~0/ ~+5.23 ± 0.1<br>~0/ ~+11.57 ± 0.1<br>~0/ ~-11.54 ± 0.1 | 5.25<br>11.59<br>-11.56           | حاد                 |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                             | _  | _                                 | OK                  |

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# 7.2.2.26 Procedure SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | Spectrometer BDAs integrity check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON. |
| Final configuration   | Unchanged  |
| Preconditions         |  |
| Duration              | 12 minutes   |
| Pass/Fail criteria    | DCU HK parameters show expected values   |

#### **Procedure Steps:**

| Before/During/After 7 1 | Before/During/After | Failure |
|-------------------------|---------------------|---------|
| 1                       |                     | OK      |
|                         |                     |         |
| _                       | _                   | OK      |
|                         |                     |         |
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Date: 17.02.09



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#### 7.2.2.27 Procedure SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P

| Version                               | 2.4  |  |
|---------------------------------------|--|--|
| Date                                  | 6th December 2007  |  |
| Purpose Spectrometer BDAs noise check |  |  |
| Initial configuration                 | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |  |
| santo I disparantementa               | and MCU PRIME is booted and Spectrometer BDAs are ON.                                      |  |
| Final configuration                   | Unchanged  |  |
| Preconditions                         | SPIRE DRCU PRIME is switched ON     SPIRE MIB PRIME is imported in the CCS database.       |  |
| growby the contraction of             | CCS is up and running     FUNCTIONAL TEST PARAMETERS display is selected on the CCS        |  |
| Duration                              | 5 minutes  |  |
| Pass/Fail criteria                    | Spectrometer BDA signals show no excess noise  |  |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit            | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|-----------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that the Spectrometer detectors and LIAs are switched on           | SPECJFETSTAT<br>SLIABITSTAT | 7                                   | 7                                 | OVC                 |
| 2    | Execute TCL script SPIRE-IST-COLD-<br>FUNC-DCU-14-SPEC-P.tcl             | _                           | _                                   | _                                 | OK                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                           | _                                   | _                                 | ok.                 |

|   | <br> | <br>~, |
|---|------|--------|
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# 7.2.2.28 Procedure SPIRE-IST-COLD- SPEC-VSS-P

| Version               | 2.5   |
|-----------------------|---|
| Date                  | 10 <sup>th</sup> July 2008  |
| Purpose               | Spectrometer BDAs Vss Test PRIME  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON.  |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 40 minutes  |
| Pass/Fail criteria    | Spectrometer BDA Vss values are optimised   |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that the Spectrometer detectors and            | SPECJFETSTAT     | 7                                   | 7.                                |                     |
|      | LIAs are switched on                                 | SLIABITSTAT      | 1                                   | ) T                               | 01                  |
| 2    | Execute TCL script SPIRE-IST-COLD-<br>SPEC-VSS-P.tcl | _                | _                                   | _                                 | OK                  |
| 3    | Wait for the I-EGSE staff to confirm the             |                  | _                                   |                                   |                     |
|      | success or failure of this test                      |                  |                                     |                                   | OK                  |

Test Result (Pass/Fail):

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7.2.2.29

# Procedure SPIRE-IST-COLD-SDET-OFF-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Spectrometer BDAs Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are OFF  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 3 minutes   |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

**Procedure Steps:** 

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| Step   | Description  | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-<br>SDET-OFF-P.tcl                     | _                |                                     | OK                                | OK                  |
| 2      | Check that the Spectrometer detectors are switched off                   | SPECJFETSTAT     | 7/-/0                               | 7/0                               | OK                  |
| 3      | Check that the Spectrometer LIAs are switched off                        | SLIABITSTAT      | 1/-/0                               | 1/0                               | ٥٤                  |
| 4      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |
| Test F | lesult (Pass/Fail):  |                  |                                     |                                   |                     |

| Step-<br>No. | Test-Step-Description                             | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks      | P   | N |
|--------------|---|------------------|-----------|-----------------|--------------|-----|---|
|              | Cryostat Check Procedure for CFT                  |                  |           |                 | has a second |     |   |
| 5            | Record Temperatures:                              |                  |           |                 |              |     |   |
|              | T246: (KD223302 if connected to CCU)              | >5K - <50K       |           | 26.77           | TZ49         | ck  |   |
|              | T247: (KD223303 if connected to CCU)              |                  |           | 26.46           | T249<br>T251 | CC. | 1 |
| 6            | Inform Cryo Engineers that Level 3 temperature no | ОК               |           |                 | ,            |     |   |
|              | longer needs to be maintained between 5K and 50K  |                  |           | OL              |              | OK  |   |
|              | End of Cryostat Check                             |                  |           |                 |              |     |   |

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7.2.2.30 Procedure SPIRE-IST-COLD-MCU-OFF-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU PRIME Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is OFF.  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is ON.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified MCU HK Parameter shows expected value.  |

### **Procedure Steps:**

| Step | Description                          | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--------------------------------------|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-MCU-OFF-P.tcl | _                |                                     | <b>—</b> .                        | ٥٧.                 |
| 2    | Check that the MCU is switched off   | MCUBITSTAT       | 1/-/0                               | 1/,0                              | OK                  |

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# 7.2.2.31 Procedure SPIRE-IST-COLD-SCU-OFF-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU PRIME Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON. |
| Final configuration   |   |
| Preconditions         |   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified SCU HK Parameters show expected value.  |

# **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-SCU-OFF-P.tcl               | _                | _                                   | _                                 | OK                  |
| 2    | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT      | 0xFFFF/-/0                          | OXFIFE / O                        | Ot.                 |
| 3    | A few seconds later record the value of parameter SUBKSTAT    | SUBKSTAT         | 1/-/0                               | 110                               | OK                  |

lest Result (Pass/Fail)

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# 7.2.2.32 Switch OFF SPIRE PRIME

| Step |    | Test-Step-Description  | Nominal Value | Actual Value | Remarks | Р  | N |
|------|----|--|---------------|--------------|---------|----|---|
|      | 1. | From the HPCCS test conductor console start the test script to power OFF SPIRE Prime:  \$102999SCVT032_ASDCFTSPIR_PWR_OFF_P                      | ок            | OK           |         | OK |   |
|      | 2. | On HPCCS when prompted:  "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES | YES           | Yes          |         | OK |   |
|      |    | If YES is selected the test script will go on to automatically power off all SPIRE warm units.   |               |              |         |    |   |

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| Step-<br>No. | Test-Step-Description   | Nominal Value    | Actual Value | Remarks       | Р  | N |
|--------------|---|------------------|--------------|---------------|----|---|
|              | Note that during Switch OFF of SPIRE the following (5,2) and (5,4) event messages on APID 1280 may be expected and do not indicate a problem: |                  |              |               |    |   |
|              | a) EVID 1313 No_MCU_Response_Error<br>b) EVID 21773 ALARM_LSMCU_DEAD  |                  |              |               |    |   |
|              | However, be aware that if FDIR is enabled for SPIRE in the CDMU then this may trigger an OBCP   |                  |              |               |    |   |
|              | On HPCCS when prompted:   |                  |              | AND: SA_1_559 |    | ļ |
|              | "Check Telemetry No Longer Updating - OK to continue"   |                  |              | AND. 3A_1_559 |    |   |
| 3.           | Check that parameters:  |                  |              |               |    |   |
|              | THSK  | Not refreshing   | OK           |               | OK |   |
|              | TM2N  | Not incrementing | OK           |               | OK |   |
| 4.           | Select OK to continue   | ОК               | OK           |               | OK |   |

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| Step<br>No. | )- | Test-Step-Description   | Nominal Value | Actual Value | Remarks | P   | N |
|-------------|----|---|---------------|--------------|---------|-----|---|
|             | 5. | On HPCCS when all autonomous actions have been completed by the power on script \$102999SCVT032_ASDCFTSPIR_PWR_OFF_P it will prompt:  "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue" |               | 0 K          |         | ٥٠  |   |
|             | 6. | Select OK to continue   | ОК            | 01د          |         | 0 1 |   |
|             | 7. | On HPCCS stop Packet History displays for the following APIDs:1280,1282   | ок            | OŁ           |         | OK  |   |
|             |    | SPIRE PRIME OFF   |               |              |         |     |   |

|                       | •        |        |           | <del></del> |                |
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#### 7.2.3 Cold Functional Tests - Redundant

#### 7.2.3.1 Switch ON SPIRE REDUNDANT

The following will switch ON and configure SPIRE Redundant instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1281 dec and 1283 decimal (these can be observed using TMPH with corresponding filter - note however a limited number of TMPHs should be running at one time).

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE is in REDY mode. When in REDY mode one parameter remains OOL (soft) namely SMD2V505 this is also expected.

| Step- | No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks  | Р  | N |
|-------|-----|--|---------------|--------------|--|----|---|
| 1.    |     | On HPCCS start Packet History displays for the following APIDs:1281,1283   | ок            | 01c          |  | ok |   |
| 2.    |     | From the HPCCS test conductor console start the test script to power on SPIRE Redundant:  S102999SCVT033_ASDCFTSPIR_PWR_ON_R | ок            | OK           | AND: ZAD07999,<br>ZAD14999<br>MIM:<br>LCL_HERSCHEL | OK |   |

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| Ste | p-No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks       | Р  | N |
|-----|-------|--|---------------|--------------|---------------|----|---|
|     | 3.    | On HPCCS when prompted:  "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES  | YES           | Yes          |               | OK |   |
|     |       | If <b>YES</b> is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below. |               |              |               |    |   |
|     | 4.    | On HPCCS when prompted:  "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue"  Select OK  | ОК            | ٥١٧          | AND: SA_1_559 | OK |   |
|     | 5.    | If I-EGSE connected when prompted on HPCCS, perform check requested then select <b>OK</b> :  "Check IEGSE Time Consistent - OK to continue when RAL confirm"   | ОК            | o k          |               | OK |   |

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| Step-No. | Test-Step-Description                                    | Nominal Value           | Actual Value | Remarks   | Р  | N |
|----------|--|-------------------------|--------------|---|----|---|
|          | On HPCCS when prompted:                                  |                         |              | Note: Two TC                                    | 1  |   |
|          | "Check Telemetry No Longer<br>Updating - OK to continue" |                         |              | failures on<br>SCR00500 are                     |    |   |
| 6.       | Check that parameters:                                   |                         |              | expected<br>because HKTM<br>has been<br>stopped | OK |   |
|          | THS  | Not refreshing          | OK           | оторроц   |    |   |
|          | TM2N   | Not incrementing        | ok           |   |    |   |
|          | Select OK to continue                                    | ок                      | OK           |   |    |   |
|          | On HPCCS when prompted:                                  |                         |              | AND: SA_1_559                                   |    |   |
|          | "Check Telemetry Updating Correctly - OK to continue"    |                         |              |   |    |   |
| 7.       | Check that parameters:                                   |                         |              |   |    |   |
|          | THS  | Refreshing @ 1Hz        | OL           |   | OK |   |
|          | TM2N   | Incrementing by 1 @ 1Hz | OK           |   |    |   |
|          | Select OK to continue                                    | ок                      |              |   |    |   |

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| Step | -No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks | Р   | N |
|------|------|---|---------------|--------------|---------|-----|---|
| 8    | 3.   | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT033_ASDCFTSPIR_PWR_ON_R it will prompt:  "Set Bus Profile Back to Original Setting?" Select NO | NO            | 2            |         | O K |   |
| Ç    | 9.   | At the prompt:  "Bus Profile left unchanged"  Select OK to continue   | ок            | OK           |         | OK  |   |
|      | 10.  | Verify HK TM packets are being received on APIDs 1281 & 1283  | ок            | OK           |         | OK  |   |
|      |      | SPIRE DPU & DRCU Redundant powered  |               |              |         |     |   |

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# 7.2.3.2 Procedure SPIRE-IST-COLD-FUNC-SCU-02-R

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | SCU Nominal Science Contents Check REDUNDANT   |
| Initial configuration |  |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE-IST-COLD-DPU-ON-R and SPIRE-IST-COLD-DRCU-ON-R procedures have been executed.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>I-EGSE is up and running</li> <li>DPU AND OBS PARAMETERS &amp; FUNCTIONAL TEST PARAMETERS displays are selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | HK parameters have the expected values   |

# **Procedure Steps:**

| Step | Description   | Parameter           | Expected<br>Values Before/<br>After | Actual<br>Values<br>Before<br>/After | Success/<br>Failure |
|------|---|---------------------|-------------------------------------|--------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-02-R.tcl | SCUFRAMECNT<br>TM5N | 0/31<br>0x3FFF/1                    | 0(31<br>023FFF /)                    | اثار                |

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# 7.2.3.3 Procedure SPIRE-IST-COLD-FUNC-SCU-03-R

|          | Version               | 2.4   |
|----------|-----------------------|---|
|          | Date                  | 6th December 2007   |
|          | Purpose               | SCU DC thermometry check  |
| J. G. C. | Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced  |
|          | Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and DC thermometry is ON   |
|          | Constraints           | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
|          | Duration              | 8 minutes   |
|          | Pass/Fail Criteria    | SCU DC thermometry channels show temperature readings according to the actual instrument temperature  |

### **Procedure Steps:**

| Ste | p | Description  | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|-----|---|--|------------------|---------------------------------------|---|---------------------|
| 1   |   | Execute TCL script SPIRE-IST-<br>COLD-FUNC-SCU-03-R.tcl      | _                | _                                     | _   | OK                  |
| 2   |   | Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm | _                | _                                     | _   | OK                  |

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| Step | Description  | Parameter - Unit  | Expected Values Before/ During/ After  | Actual Values Before/ During/ After   | Success/<br>Failure |
|------|--|---|--|---|---------------------|
| 3    | A few seconds later record the value of parameter SCUTEMPSTAT                              | SCUTEMPSTAT   | 0/0xFFFF/0xFFFF  | DXFFFF  | ok                  |
| 4    | If the instrument is at He I temperatures check the values of SCU DC thermometry channels. | PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SLOTEMP PLOTEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP BSMITEMP | (All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.8K ~4.8K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K | 5985001<br>59855001<br>5985555<br>588555<br>58555<br>5855<br>5855<br>5855<br>58 |                     |
| 5    | If the instrument is at He II temperatures check the values of                             | PUMPHTRTEMP   | (All Values TBC)<br>-/~4.6K  | AIN   |                     |

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| Step      | Description                    | Parameter - Unit | Expected Values<br>Before/ | Actual<br>Values | Success/<br>Failure |
|-----------|--------------------------------|------------------|----------------------------|------------------|---------------------|
|           |                                |                  | During/                    | Before/          |                     |
|           |                                |                  | After                      | During/          |                     |
|           |                                |                  |                            | After            |                     |
|           | SCU DC thermometry channels.   | PUMPHSTEMP       | -/~3.0K                    | ·                |                     |
|           |                                | EVAPHSTEMP       | -/~3.0K                    |                  |                     |
|           |                                | SHUNTTEMP        | -/~1.7K                    |                  |                     |
|           |                                | EMCFILTEMP       | -/~4.6K                    |                  |                     |
|           |                                | SL0TEMP          | -/~1.7K                    |                  |                     |
|           |                                | PL0TEMP          | -/~1.7K                    |                  |                     |
|           |                                | OPTTEMP          | -/~4.6K                    |                  |                     |
|           |                                | BAFTEMP          | -/~4.6K                    | NIA              | NW                  |
|           |                                | BSMIFTEMP        | -/~4.5K                    |                  | 10 11               |
|           |                                | SCAL2TEMP        | -/~4.6K                    |                  |                     |
|           |                                | SCAL4TEMP        | -/~4.6K                    |                  |                     |
|           |                                | SCALTEMP         | -/~4.6K                    |                  |                     |
|           |                                | SMECIFTEMP       | -/~4.6K                    |                  |                     |
|           |                                | SMECTEMP         | -/~4.6K                    |                  |                     |
|           |                                | BSMTEMP          | -/~4.5K                    |                  |                     |
| 6         | Wait for the I-EGSE staff to   | _                |                            | _                |                     |
|           | confirm the success or failure |                  |                            |                  | Ore                 |
|           | of this test                   |                  |                            |                  |                     |
| Test Resu | ult (Pass/Fail):               |                  |                            |                  |                     |

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# 7.2.3.4 Procedure SPIRE-IST-COLD-FUNC-SCU-06-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU AC thermometry check  |
| Initial configuration |   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Constraints           | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 2 minutes   |
| Pass/Fail Criteria    | SCU AC thermometry channel shows temperature readings according to the actual instrument temperature  |

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# **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-<br>SCU-06-R.tcl                                   | _                | _                                     | _                                   | 014                 |
| 2    | Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm                              | _                | _                                     | _                                   | ٥٧                  |
| 3    | A few seconds later record the value of parameter SUBKSTAT                                | SUBKSTAT         | 0/1/1                                 | 1                                   | OK                  |
| 4    | If the instrument is at He I temperatures check the value of SCU AC thermometry channel.  | SUBKTEMP         | ~4K                                   | 6.24                                | OK                  |
| 5    | If the instrument is at He II temperatures check the value of SCU AC thermometry channel. | SUBKTEMP         | ~1.7K                                 | NA                                  | 240                 |
| 6    | Wait for the I-EGSE staff to confirm the success or failure of this test                  |                  | _                                     | _                                   | OK                  |

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# 7.2.3.5 Procedure SPIRE-IST-COLD-FUNC-SCU-07-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Sorption Cooler Heater Check  |
| Initial configuration |   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Constraints           | This test should not be performed at He II temperatures, unless specifically instructed to do so by the I-EGSE staff.   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail Criteria    |   |

Procedure Steps:

| Step | Description  | Parameter – Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|--|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-07-R.tcl            | _                | _                                     | _   | OK                  |
| 2    | Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk | BBFULLTYPE       | Cooler_Htr_Chk                        | OK  | OK                  |

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| Step | Description   | Parameter – Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|---|---------------------|
| 3    | Record the value of parameter SPHSV – the Sorption Pump Heat Switch Voltage. This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue. | SPHSV – mV       | 0/~323/0                              | 323.725   | OK                  |
| 4    | Record the value of parameter  EVHSV – the Evaporator Heat Switch Voltage.  This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.  | EVHSV - mV       | 0/~323/0                              | 324.786   | OΚ                  |
| 5    | Record the value of parameter SPHTRV – the Sorption Pump Heater Voltage. This voltage stays on for ~20 seconds.Wait for the voltage to go to zero to continue.      | SPHTRV – V       | 0/~8.8/0                              | 8.85  | ok                  |
| 6    | Wait for the I-EGSE staff to confirm the success or failure of this test  Test Result (Pass/Fail):  | _                | _                                     | <u> </u>  | OK                  |

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# 7.2.3.6 Procedure SPIRE-IST-COLD-FUNC-PCAL-01-R

| Version               | 1.0  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | PCAL Characterisation Check (REDUNDANT)  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON   |
| Final configuration   | Unchanged  |
| Constraints           | This test should only be performed at He I or He II temperatures   |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON     SPIRE MIB REDUNDANT is imported in the CCS database.     CCS is up and running     FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration              | 5 minutes  |
| Pass/Fail Criteria    | PCAL voltage and current agree with expected values  |

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Procedure Steps:

| Step   | Description  | Parameter Name – Unit | Expected Values<br>Before/<br>During/<br>After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |  |  |
|--------|--|-----------------------|--|---|---------------------|--|--|
| 1      | Execute TCL script SPIRE-IST-COLD-FUNC-PCAL-01-R.tcl                     | _                     | _  | _   | ٥٢                  |  |  |
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                     | _  | _   | OIC                 |  |  |
| Test R | Test Result (Pass/Fail):   |                       |  |   |                     |  |  |

Final Configuration: Unchanged

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#### 7.2.3.7 Procedure SPIRE-IST-COLD-FUNC-SCAL-01-R

| Version               | 1.0   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCAL Characterisation Check (REDUNDANT)   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Final configuration   | Unchanged   |
| Constraints           | This test should only be performed at He I or He II temperatures.  If the test is to be performed at He II temperature then please confirm with I-EGSE staff first.   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 18 minutes  |
| Pass/Fail criteria    | SCAL2 and SCAL4 voltage and currents agree with expected values   |

#### **Procedure Steps:**

| Step                     | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |  |
|--------------------------|--|------------------|-------------------------------------|-----------------------------------|---------------------|--|
| 1                        | Execute TCL script SPIRE-IST-COLD-FUNC-SCAL-01-R.tcl                     | _                | _                                   | _                                 | OK                  |  |
| 2                        | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | 01<                 |  |
| Test Result (Pass/Fail): |  |                  |                                     |                                   |                     |  |

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# 7.2,3.8 Procedure SPIRE-IST-COLD-FUNC-MCU-01-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU (REDUNDANT) Boot Check  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted.   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              |   |
| Pass/Fail criteria    | MCU voltages and board temperatures show expected 'ON' values   |

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# Procedure Steps:

| Step  | Description   | Parameter – Unit                                   | Expected Values Before/ During/ After  | Actual Values Before/ During/ After        | Success/<br>Failure |
|-------|---|--|--|--|---------------------|
| 1     | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-01-R.tcl                     | _  | _  | _  | OK                  |
| 2     | Check that the MCU is booted up successfully                            | MCUBITSTAT   | 0/1/1  | 011  | OK                  |
| 3     | Check MCU HK parameter values and ensure that the values are refreshing | MCUP5V<br>MCUP14V<br>MCUM14V<br>MCUP15V<br>MCUM15V | ~ $5.0 \pm 0.2V$<br>~ $14.0 \pm 0.5V$<br>~ $-14.0 \pm 0.5V$<br>~ $15.0 \pm 0.5V$<br>~ $-15.0 \pm 0.5V$ | 5.00<br>14:13<br>-14:49<br>15:50<br>-18:61 | 9K                  |
| est R |   | MCUMACTEMP<br>MCUSMECTEMP<br>MCUBSMTEMP            | ~300K<br>~300K<br>~300K  | 29%,07<br>302,15°<br>301,74                |                     |

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# 7.2.3.9 Procedure SPIRE-IST-COLD-FUNC-MCU-03-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU Nominal Science Contents Check  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted.   |
| Final configuration   | Unchanged.  |
| Preconditions         |   |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified MCU HK parameters show expected increment   |

#### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-03-R.tcl | MCUFRAMECNT      | 0/-/297                               | 0/297                               | OK                  |

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# 7.2.3.10 Procedure SPIRE-IST-COLD-FUNC-BSM-01-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (REDUNDANT) Chop/Jiggle Sensor Check.   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON.                             |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is booted.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected ON values.                          |

#### **Procedure Steps:**

| Step | Description   | Parameter – Unit           | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|----------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-01-R.tcl     | _                          | -                                   | _                                 | OK                  |
| 2    | Check that the Chop and Jiggle sensors have switched on | CHOPSENSPWR<br>JIGGSENSPWR | 0/1/1                               | 1                                 | ok                  |

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### 7.2.3.11 Procedure SPIRE-IST-COLD-FUNC-BSM-03-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (REDUNDANT) Open Loop Dynamics Check.   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is   |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | CHOPSENSSIG/JIGGSENSIG HK parameter evolve in the same direction as the commanded positions   |

#### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-03-R.tcl                      | _                | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | QI<                 |

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#### 7.2.3.12 Procedure SPIRE-IST-COLD-FUNC-BSM-05A-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (REDUNDANT) Open Loop Chop Test   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is   |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | The BSM Chops between the commanded positions   |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05A-R.tcl                     | _                | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |

Test Result (Pass/Fail):

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# 7.2.3.13 Procedure SPIRE-IST-COLD-FUNC-BSM-05B-R

| Version               | 2.4  |  |  |  |
|-----------------------|--|--|--|--|
| Date                  | 6th December 2007  |  |  |  |
| Purpose               | BSM (REDUNDANT) Close Loop Chop Test   |  |  |  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is  |  |  |  |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON.  |  |  |  |
| Final configuration   | BSM is in closed loop mode   |  |  |  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS</li> </ul> |  |  |  |
| Duration              | 5 minutes  |  |  |  |
| Pass/Fail criteria    | The BSM Chops in between the commanded positions   |  |  |  |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit             | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-BSM-INIT-R.tcl                                    | CHOPLOOPMODE<br>JIGGLOOPMODE | 3/-/1<br>3/-/1                      | 3/ 1                              | O C                 |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05B-R.tcl                     | _                            | _                                   | _                                 | OK                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                            | _                                   | _                                 | 01<                 |

Test Result (Pass/Fail):

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# 7.2.3.14 Procedure SPIRE-IST-COLD-FUNC-BSM-06-R

| Version                                 | 2.4   |
|---|---|
| Date                                    | 6th December 2007   |
| Purpose                                 | BSM (REDUNDANT) Closed Loop Operational Mode Chop Test                                      |
| Initial configuration                   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|   | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON. BSM is in closed loop.      |
| Final configuration                     | Unchanged   |
| Preconditions                           | SPIRE DRCU REDUNDANT is switched ON   |
|   | SPIRE MCU REDUNDANT is booted.  |
|   | SPIRE MIB REDUNDANT is imported in the CCS database.  |
| [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] | CCS is up and running   |
|   | CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS                      |
| Duration                                | 5 minutes   |
| Pass/Fail criteria                      | The BSM Chops between the commanded positions   |

# **Procedure Steps:**

| Step | Description  | Parameter – Unit             | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD BSM-06-R.tcl                                      | CHOPLOOPMODE<br>JIGGLOOPMODE | 1/1/1                               | \                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                            | _                                   |                                   | 016                 |

Test Result (Pass/Fail):

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#### 7.2.3.15 Procedure SPIRE-IST-COLD-BSM-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | BSM (REDUNDANT) Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are ON.                             |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. BSM Chop/Jiggle sensors are OFF.                            |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is booted.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected OFF values.                         |

# **Procedure Steps:**

| Step | Description                                | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-BSM-OFF-R.tcl       |                  | _                                   | _                                 | OK                  |
| 2    | Check that the power to the BSM sensors is | CHOPSENSPWR      | 1/-/0                               | 1/0                               | ~ )e                |
|      | switched off                               | JIGGSENSPWR      | 1/-/0                               | 110                               | 06                  |

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# 7.2.3.16 Procedure SPIRE-IST-COLD-FUNC-SMEC-01-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SMEC (REDUNDANT) Encoder/LVDT Sensor Check.   |
| Initial configuration |   |
|                       | ON and MCU REDUNDANT is booted.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.                               |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is booted.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              |   |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.                           |

# **Procedure Steps:**

| Step | Description  | Parameter – Unit          | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|---------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-01-R.tcl   | _                         | _                                   | _                                 | 01                  |
| 2    | Check that power to the SMEC LED and LVDT sensor is on | SMECENCPWR<br>SMECLVDTPWR | 0/-/3<br>0/-/1                      | 0/3                               | OK                  |

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# 7.2.3.17 Procedure SPIRE-IST-COLD-FUNC-SMEC-03-R

| Version  | 2.4   |
|--|---|
| Date   | 6th December 2007   |
| Purpose  | SMEC (REDUNDANT) Encoder Integrity Check.   |
| Initial configuration  | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
| Local production of the control of t | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.  |
| Final configuration  | Unchanged   |
| Preconditions  | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration   | 5 minutes   |
| Pass/Fail criteria   | MCUENGSMECENCSIG1/2 increase as the encoder power is increased  |

# **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-03-R.tcl                     | _                | _                                   | _                                 | OK                  |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |

|          |               |          |       |           | 1          |
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# 7.2.3.18 Procedure SPIRE-IST-COLD-SMEC-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SMEC (REDUNDANT) Switch OFF   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.                               |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are OFF.                              |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is booted.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 3 minutes   |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.                          |

**Procedure Steps:** 

| Step                     | Description                                 | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |  |  |
|--------------------------|---|------------------|-------------------------------------|-----------------------------------|---------------------|--|--|
| 1                        | Execute SPIRE-IST-COLD-SMEC-OFF-R.tcl       | _                | _                                   | _                                 | OK                  |  |  |
| 2                        | Check that the power to the SMEC sensors is | SMECENCPWR       | 3/-/0                               | 210                               | •                   |  |  |
|                          | switched off                                | SMECLVDTPWR      | 1/-/0                               | 110                               | OK.                 |  |  |
| Test Result (Pass/Fail): |   |                  |                                     |                                   |                     |  |  |

|          |                  |        |    |       |           |   |     | ,        |       |      |
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# 7.2.3.19 Procedure SPIRE-IST-COLD-FUNC-DCU-02-R

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks      | Р   | N |
|--------------|---|------------------|-----------|-----------------|--------------|-----|---|
|              | Cryostat Check Procedure for CFT  |                  |           |                 |              |     |   |
| 2            | Prior to performing next step verify that Level 3 temperature is between 5K and 50K (sensors T246 & T247)               | ОК               |           | OK              |              | Ble |   |
| 3            | Record Temperatures:  T246: (KD223302 if connected to CCU)  T247: (KD223303 if connected to CCU)  End of Cryostat Check |                  |           | 25.84<br>25.88  | T249<br>T251 | ok  |   |

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | DCU Nominal Science Contents Check REDUNDANT   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are switched ON, SPIRE HK is being produced and MCU is booted.  |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE-IST-COLD-DPU-ON-R and SPIRE-IST-COLD-DRCU-ON-R procedures have been executed.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>I-EGSE is up and running</li> <li>DCU PARAMETERS display is selected on the CCS</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | DCU HK parameters increment as expected  |

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### Procedure Steps:

| Step   | Description  | Parameter   | Expected<br>Values Before/<br>After | Actual<br>Values<br>Before<br>/After | Success/<br>Failure |
|--------|--|-------------|-------------------------------------|--------------------------------------|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-02-R.tcl                      | DCUFRAMECNT | n/n+700                             | 1200/1900                            | OK                  |
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test | _           | _                                   | _                                    | ok                  |
| Test R | esult (Pass/Fail):   |             |                                     | I                                    |                     |

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# 7.2.3.20 Procedure SPIRE-IST-COLD-FUNC-DCU-11-PHOT-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Photometer BDAs switch ON check   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted and Photometer BDAs are ON.  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 7 minutes   |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

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#### 7.2.3.21 Procedure SPIRE-IST-COLD-FUNC-DCU-13-PHOT-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Photometer BDAs integrity check   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
|                       | is ON and MCU REDUNDANT is booted and Photometer BDAs are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 15 minutes  |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

# **Procedure Steps:**

| Step   | Description                                  | Parameter - Unit | Expected Values     | Actual Values       | Success/ |
|--------|--|------------------|---------------------|---------------------|----------|
|        |  |                  | Before/During/After | Before/During/After | Failure  |
| 1      | Check that Photometer LIAs and detectors are | PLIABITSTAT      | 1                   | *                   |          |
|        | switched on                                  | PSWJFETSTAT      | 9×3E                | 0x3f                | 06       |
|        |  | PMLWJFETSTAT     | 0x7F                | OXIF                | -        |
| 2      | Execute TCL script SPIRE-IST-COLD-FUNC-      | -                | _                   |                     |          |
|        | DCU-13-PHOT-R.tcl                            |                  | 5.                  |                     |          |
| 3      | Wait for the I-EGSE staff to confirm the     |                  | - KIP.              | _                   |          |
|        | success or failure of this test              |                  |                     |                     |          |
| Test F | Result (Pass/Fail):                          |                  |                     |                     |          |

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### Procedure Steps:

| Step | Description   | Parameter – Unit   | Expected Values Before/During/After  | Actual Values Before/During/After                 | Success/<br>Failure |
|------|---|--|--|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-11-PHOT-R.tcl                                  | _  | _  | _   | OK                  |
| 2    | Check that the Photometer detectors and LIAs are switched on                              | PSWJFETSTAT PMLWJFETSTAT PLIABITSTAT PLIAP5V PLIAP9V PLIAM9V | 0/-/0x3F<br>0/-/0x7F<br>1<br>~0/ ~+5.19 ± 0.1V<br>~0/ ~+11.54 ± 0.1V<br>~0/ ~-11.53 ± 0.1V | 0.10x3F<br>010x7F<br>1<br>5.24<br>11.60<br>-11.88 | ok                  |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test ult (Pass/Fail): |  | _  | _   | OK                  |

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#### 7.2.3.22 Procedure SPIRE-IST-COLD-FUNC-DCU-14-PHOT-R

| Version                      | 2.4  |
|------------------------------|--|
| Date Date                    | 6th December 2007  |
| Purpose                      | Photometer BDAs noise level check  |
| Initial configuration        | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry |
| LINE A PROPERTY AND ADDRESS. | is ON and MCU REDUNDANT is booted and Photometer BDAs are ON.                            |
| Final configuration          | Unchanged  |
| Preconditions                | SPIRE DRCU REDUNDANT is switched ON  |
|                              | <ul> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> </ul>                 |
|                              | CCS is up and running  |
|                              | <ul> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul>            |
| Duration                     | 5 minutes  |
| Pass/Fail criteria           | Photometer BDA signals show no excess noise  |

#### **Procedure Steps:**

| Step   | Description  | Parameter - Unit | Expected Values     | Actual Values       | Success/ |
|--------|--|------------------|---------------------|---------------------|----------|
|        |  |                  | Before/During/After | Before/During/After | Failure  |
| 1      | Check that Photometer LIAs and detectors are             | PLIABITSTAT      | 1                   |                     |          |
|        | switched on  | PSWJFETSTAT      | 9x3F                |                     |          |
|        |  | PMLWJFEISTAT     | 0x7F                |                     |          |
| 2      | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-14-PHOT-R.tcl | -                | = 10                | -                   |          |
| 3      | Wait for the I-EGSE staff to confirm the                 |                  |                     |                     |          |
|        | success or failure of this test                          |                  |                     |                     |          |
| Test R | esult (Pass/Fail):                                       |                  |                     |                     | L        |

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#### 7.2.3.23 Procedure SPIRE-IST-COLD -PHOT-VSS-R

| Version               | 1.1   |
|-----------------------|---|
| Date                  | 10 <sup>th</sup> July 2008  |
| Purpose               | Photometer BDAs Vss Test REDUNDANT  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
|                       | is ON and MCU REDUNDANT is booted and Photometer BDAs are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 40 minutes  |
| Pass/Fail criteria    | Photometer BDA Vss values are optimised   |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit                     | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|--------------------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that Photometer LIAs and detectors are switched on                 | PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT | 1<br>0x3F<br>0x7F                   |                                   |                     |
| 2    | Execute TCL script SPIRE-IST-COLD - PHOT-VSS-R.tcl                       |                                      | - 0x                                | -2                                |                     |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                                    | _                                   | _                                 |                     |

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# 7.2.3.24 Procedure SPIRE-IST-COLD-PDET-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Photometer BDAs Switch OFF  |
| Initial configuration |   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted and Photometer BDAs are OFF  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 3 minutes   |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

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### **Procedure Steps:**

| Step | Description  | Parameter - Unit            | Expected Values Before/During/After | Actual Valu<br>Before/Dur |          | Success/<br>Failure |
|------|--|-----------------------------|-------------------------------------|---------------------------|----------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-PDET-<br>OFF-R.tcl                     | _                           | _                                   | _                         | <i>j</i> | OK                  |
| 2    | Check that the Photometer detectors are switched off                     | PSWJFETSTAT<br>PMLWJFETSTAT | 0x3F/-/0<br>0x7F/-/0                | OX#/                      | 0        | ok                  |
| 3    | Check that the Photometer LIAs are switched off                          | PLIABITSTAT                 | 1/-/0                               | 1/0                       |          | ەلد                 |
| 4    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                           | _                                   | _                         |          | 014                 |
| •    |  | _                           | _                                   |                           |          |                     |

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# 7.2.3.25 Procedure SPIRE-IST-COLD-FUNC-DCU-11-SPEC-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Spectrometer BDAs switch ON check   |
| Initial configuration |   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted and Spectrometer BDAs are ON.  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              |   |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

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# Procedure Steps:

| 1 |  |  | Before/During/After  | Before/During/After       | Failure |
|---|--|--|--|---------------------------|---------|
|   | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-11-SPEC-R.tcl                 | _  | _  | _                         | OK      |
| 2 | Check that the Spectrometer detectors and LIAs are switched on           | SPECJFETSTAT SLIABITSTAT SLIAP5V SLIAP9V SLIAM9V | 0/-/7  1  ~0/ ~+5.23 ± 0.1  ~0/ ~+11.57 ± 0.1  ~0/ ~-11.54 ± 0.1 | 0/7 0/1 5:25 11:59 -11:58 | Olc     |
| 3 | Wait for the I-EGSE staff to confirm the success or failure of this test | _  | _  | _                         | OK      |

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# 7.2.3.26 Procedure SPIRE-IST-COLD-FUNC-DCU-13-SPEC-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Spectrometer BDAs integrity check   |
| Initial configuration |   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 12 minutes  |
| Pass/Fail criteria    |   |

# **Procedure Steps:**

| Step | Description  | Parameter - Unit            | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|-----------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Check that the Spectrometer detectors and LIAs are switched on           | SPECJFETSTAT<br>SLIABITSTAT | \$ .                                | 20101012UIIIIg/Alter              | i anui e            |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-DCU-13-SPEC-R.tcl                 | _                           | -10                                 |                                   |                     |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                           | _                                   | _                                 |                     |

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### 7.2.3.27 Procedure SPIRE-IST-COLD-FUNC-DCU-14-SPEC-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Spectrometer BDAs noise check   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
|                       | is ON and MCU REDUNDANT is booted and Spectrometer BDAs are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Spectrometer BDA signals show no excess noise   |

# **Procedure Steps:**

| Step   | Description                               | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
|        |   |                  | Before/During/After                 | Belore/During/Arter               | railuie             |
| 1      | Check that the Spectrometer detectors and | SPĘCJFETSTAT     | 7                                   |                                   |                     |
|        | LIAs are switched on                      | SLIABITSTAT      | 1                                   |                                   |                     |
| 2      | Execute TCL script SPIRE-IST-COLD-        | - / 0%           | _                                   |                                   |                     |
|        | FUNC-DCU-14-SPEC-R.tcl                    |                  | 10                                  |                                   |                     |
| 3      | Wait for the I-EGSE staff to confirm the  | _                |                                     | _                                 |                     |
|        | success or failure of this test           |                  |                                     |                                   |                     |
| Test F | Result (Pass/Fail):                       |                  |                                     |                                   |                     |

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#### 7.2.3.28 Procedure SPIRE-IST-COLD- SPEC-VSS-R

| Version               | 1.1   |
|-----------------------|---|
| Date                  | 10 <sup>th</sup> July 2008  |
| Purpose               | Spectrometer BDAs Vss Test REDUNDANT  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
|                       | is ON and MCU REDUNDANT is booted and Spectrometer BDAs are ON.   |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 40 minutes  |
| Pass/Fail criteria    | Spectrometer BDA Vss values are optimised   |

#### **Procedure Steps:**

| Step   | Description                               | Parameter - Unit | Expected Values     | Actual Values       | Success/ |
|--------|---|------------------|---------------------|---------------------|----------|
|        |   |                  | Before/During/After | Before/During/After | Failure  |
| 1      | Check that the Spectrometer detectors and | SPECJFETSTAT     | 7                   |                     |          |
|        | LIAs are switched on                      | SLIABITSTAT      | 11                  |                     |          |
| 2      | Execute TCL script SPIRE-IST-COLD-        | - \              | _                   |                     |          |
|        | SPEC-VSS-R.tcl                            |                  |                     |                     |          |
| 3      | Wait for the I-EGSE staff to confirm the  |                  | _                   | _                   |          |
|        | success or failure of this test           |                  |                     | _                   |          |
| Test F | Result (Pass/Fail):                       |                  |                     |                     |          |

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# 7.2.3.29 Procedure SPIRE-IST-COLD-SDET-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | Spectrometer BDAs Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted and Spectrometer BDAs are ON   |
| Final configuration   |   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              |   |
| Pass/Fail criteria    | DCU HK parameters show expected values  |

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| Step   | Description  | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-<br>SDET-OFF-R.tcl                     | _                | _                                   |                                   | OK                  |
| 2      | Check that the Spectrometer detectors are switched off                   | SPECJFETSTAT     | 7/-/0                               | 7/0                               | 01(                 |
| 3      | Check that the Spectrometer LIAs are switched off                        | SLIABITSTAT      | 1/-/0                               | 11.0                              | 012                 |
| 4      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 | OK                  |
| Test F | success or failure of this test Result (Pass/Fail):                      |                  |                                     |                                   |                     |

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks      | Р   | N |
|--------------|--|------------------|-----------|-----------------|--------------|-----|---|
|              | Cryostat Check Procedure for CFT   |                  |           |                 |              |     |   |
| 5            | Record Temperatures:  T246: (KD223302 if connected to CCU)  T247: (KD223303 if connected to CCU)   | l .              |           | 25.91           | T249<br>T251 | 0 e | , |
| 6            | Inform Cryo Engineers that Level 3 temperature no longer needs to be maintained between 5K and 50K | ок               |           | OK              |              | OK  |   |
|              | End of Cryostat Check  |                  |           |                 |              |     |   |

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7.2.3.30 Procedure SPIRE-IST-COLD-MCU-OFF-R

| Version               | 2.4   |  |  |  |  |  |
|-----------------------|---|--|--|--|--|--|
| Date                  | 6th December 2007   |  |  |  |  |  |
| Purpose               | MCU REDUNDANT Switch OFF  |  |  |  |  |  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is booted.   |  |  |  |  |  |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU REDUNDANT is OFF.  |  |  |  |  |  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is ON.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |  |  |  |  |  |
| Duration              | 5 minutes   |  |  |  |  |  |
| Pass/Fail criteria    | Specified MCU HK Parameter shows expected value.  |  |  |  |  |  |

# **Procedure Steps:**

| Step | Description                          | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--------------------------------------|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-MCU-OFF-R.tcl | _                |                                     | _                                 | (7)                 |
| 2    | Check that the MCU is switched off   | MCUBITSTAT       | 1/-/0                               | 110.                              | 0 K                 |

|          |                       | · · · · · · · · · · · · · · · · · · · |           |                 |
|----------|-----------------------|---------------------------------------|-----------|-----------------|
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# 7.2.3.31 Procedure SPIRE-IST-COLD-SCU-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU REDUNDANT Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    |   |

**Procedure Steps:** 

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| Step | Description   | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl               | _                | _                                   | _                                 | OK                  |
| 2    | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT      | 0xFFFF/-/0                          | Oxfeff 1 0                        | ok.                 |
| 3    | A few seconds later record the value of parameter SUBKSTAT    | SUBKSTAT         | 1/-/0                               | 110                               | OK                  |

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# 7.2.3.32 Switch OFF SPIRE REDUNDANT

| Step-<br>No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks | Р   | N |
|--------------|--|---------------|--------------|---------|-----|---|
| 1.           | From the HPCCS test conductor console start the test script to power OFF SPIRE REDUNDANT:  S102999SCVT034_ASDCFTSPIR_PWR_OFF_R                   | ок            | OK           |         | OK_ |   |
| 2.           | On HPCCS when prompted:  "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES | YES           | YES          |         | OK  |   |
|              | If <b>YES</b> is selected the test script will go on to automatically power off all SPIRE warm units.  |               |              |         |     |   |

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| Step- | Test-Step-Description  | Nominal Value    | Actual Value | Remarks       | Р | N  |
|-------|--|------------------|--------------|---------------|---|----|
| NO.   | Note: During Switch OFF of SPIRE, the following (5,1) and (5,4) event messages on APID 1281 may be expected and do not indicate a problem:  c) EVID 1313 No_MCU_Response_Error d) EVID 21773 ALARM_LSMCU_DEAD  However, be aware that if FDIR is enabled for |                  |              |               |   |    |
|       | SPIRE in the CDMU then this may trigger an OBCP  |                  |              |               |   |    |
|       | On HPCCS when prompted:  |                  |              | AND: SA_1_559 |   |    |
|       | "Check Telemetry No Longer Updating - OK to continue"  |                  |              |               |   |    |
| 3.    | Check that parameters:   |                  |              |               |   |    |
|       | тнѕк   | Not refreshing   | OK           |               |   | OK |
|       | TM2N   | Not incrementing | ©χ           |               |   |    |
| 4.    | Select OK to continue  | ок               | OK           |               |   | OK |

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| Step-<br>No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks | Р  | N |
|--------------|---|---------------|--------------|---------|----|---|
| 5.           | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT034_ASDCFTSPIR_PWR_OFF_R it will prompt: |               |              |         |    |   |
|              | "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"   |               | OK           |         | 0( |   |
| 6.           | Select OK to continue   | ОК            | OK           |         | OK |   |
| 7.           | On HPCCS stop Packet History displays for the following APIDs:1281,1283   | ОК            | Ox           |         | OK |   |
|              | SPIRE REDUNDANT OFF   |               |              |         |    |   |

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# 7.2.4 Satellite & EGSE Switch Off After CFT Tests

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value          | Tolerance | Actual<br>Value |                 | Р   | N |
|--------------|---|---------------------------|-----------|-----------------|-----------------|-----|---|
|              | Satellite & EGSE Switch Off   |                           |           | 222.96          |                 |     |   |
|              | Initial Conditions: Nominal & Redundant SPIRE warm units OFF  |                           |           |                 |                 |     |   |
| 1            | On HPCSS terminate SPIRE_ALL_SubscribeParams.tcl test script.   | ок                        |           | OK              |                 | OX  |   |
| 2            | From HPCCS Test Conductor console issue command to disconnect from SPIRE I-EGSE   |                           |           | OK              |                 | OK  |   |
|              | disconnect HSPIREEGSE   |                           | -         |                 |                 |     |   |
| 3            | Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful   | YZS29940=<br>DISCONNECTED |           | DISCONNECT      | AND SYS_PARS    | OK  |   |
| 4            | If no longer required switch OFF I-EGSE i.a.w. AD 5   | ОК                        |           | NIA             |                 | OK  |   |
| 5            | Stop monitoring CryoSCOE data on the CCS by selecting Stop Record & Exit from the following script:   | ОК                        |           | ok              |                 | OK  |   |
| 6a           | K102999ECVT035_ASDGEN_SCOE_CCU_LOG  |                           | -         |                 |                 |     |   |
| Joa          | If test is perform as part of SPIRE IST Commissioning then switch off S/C, HPCCS and SCOEs i.a.w. procedure AD12 Section 7.4 continuing from step 42, then return to lead procedure AD10 section 7.4 to complete the switch-off | OK .                      |           | NW              |                 | NHA |   |
| 6b           | If test is to be performed as a standalone CFT then switch off S/C and if required downlink packet stores i.a.w. AD2 section 7.7  | ок                        |           | ak              |                 | OK. |   |
| 7            | Confirm both Satellite and EGSE powered down  | ОК                        |           | OK              | 273,000,000,000 | OK. |   |
| 8            | Stop the instrument temperature logging by terminating script:  | ок                        |           | OK              |                 | 010 |   |

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| Step-<br>No. | Test-Step-Description                  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|--|------------------|-----------|-----------------|---|---|
|              | Z102999SCVT025_ASDGEN_INSTTEMP_LOG     |                  |           |                 |   |   |
|              | End Conditions: Satellite and EGSE OFF |                  |           |                 | 1 |   |
| The state    | END OF SPIRE CFT TEST                  |                  |           | 24 655          |   |   |

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#### 7.2.5 EGSE & Satellite Switch On for SMEC Tests

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks | Р | N |
|--------------|---|------------------|-----------|-----------------|---------|---|---|
|              | Satellite & EGSE Switch On  |                  |           |                 |         |   |   |
| 0            | Confirm all constraints for the SMEC Test as defined in Section 1 have been fulfilled prior to starting the test                                      | ок               |           |                 |         |   |   |
| 1            | Confirm I-EGSE physically connected to HPCCS  | ок               |           |                 |         |   |   |
| 2            | Switch on & configure SPIRE I-EGSE i.a.w. AD5 & AD 8  | ок               |           |                 |         |   |   |
| 3            | Confirm SPIRE I-EGSE is in the correct configuration as per AD5 & AD 8 and TIME synchronised with HPCCS   | ок               |           |                 |         |   |   |
| 4            | Switch on HPCCS, SCOEs and Satellite/SVM and configure into Basic Test Mode i.a.w. AD 2 Section 7.1 to 7.5.   | ок               |           |                 |         |   |   |
| 5            | Confirm that EGSE and Satellite are in the correct configuration as per AD 2  | ок               |           |                 |         |   |   |
| 6            | If not already on, from HPCCS power ON CCU A & CCU B by executing test script:  |                  |           |                 |         |   |   |
|              | VARIABLE CATOM ASDOEMICCH ADDINOON  | ОК               |           |                 |         |   |   |
| 7            | K102999ECVT001_ASDGENCCU_ABPWRON  If not already enabled, from HPCCS enable Monitoring Mode 1  (512sec cycle) for CCU A & B by executing test script: |                  |           |                 |         |   |   |
|              | K102999ECVT001_ASDGENCCU_MnEBOTH1   | ок               |           |                 |         |   |   |
| 8            | Connect HPCCS to CRYOSCOE and verify CryoSCOE data is being received on the CCS by executing the following script:                                    |                  |           |                 |         |   |   |
|              | K102999ECVT035_ASDGEN_SCOE_CCU_LOG  | ок               |           |                 |         |   |   |

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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value       | Tolerance | Actual<br>Value | Remarks      | Р | N        |
|--------------|--|------------------------|-----------|-----------------|--------------|---|----------|
| 9            | From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE       |                        |           |                 |              |   |          |
|              | connect HSPIREEGSE   | ок                     |           |                 |              |   |          |
| 10           | Confirm from HPCCS and SPIRE I-EGSE that the connection has been established     | YZS29940=<br>CONNECTED |           |                 | AND SYS_PARS |   |          |
| 11           | Verify that I-EGSE is receiving CCU Cryo packets                                 | ок                     | 7         |                 |              | + | $\vdash$ |
| 12           | On HPCCS start the following test script:  |                        |           |                 |              |   |          |
|              | ALL_SubscribeParams.tcl  | ок                     | 1 1       |                 |              |   |          |
| 13           | Verify HPCCS-IEGSE connection by sending test command: YC00X966                  | ок                     |           |                 |              |   |          |
|              | From the manual command stack (repeater value of "0")                            | 1                      |           |                 |              |   |          |
| 14           | If required load Synoptics INSTRUMENTS on HPCCS to display SPIRE status overview |                        |           | 1               |              |   |          |
|              | READY FOR START OF SPIRE SMEC TESTS  |                        |           |                 |              |   | $\vdash$ |

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#### 7.2.6 SMEC Tests

### 7.2.6.1 Verify Nominal Latch Command Relay Status

Verify launch lock relays are positioned to allow SMEC launch lock to be unlatched.

| Step-No. | Test-Step-Description   | Nominal Value    | Actual Value | Remarks   | Р | N |
|----------|---|------------------|--------------|---|---|---|
|          | All TCs to be sent from the Manual Command Stack  |                  |              |   |   |   |
| 1.       | Send <b>DC904180</b> and verify from the resulting (14,4) packet that packet 120 (dec) is not already enabled (i.e. NOT present in the list). If present skip steps 2 – 4 | 120 not present  |              | Step 1 to 5 only<br>required on<br>CDMS ASW 3.4 |   |   |
| 2.       | Send <b>ZCB00999</b> to allocate new diagnostic packet  | ок               |              |   |   |   |
| 3.       | Send <b>DC900180</b> with repeater value 1 and parameters: DH019180 = 26, DH020180=120  | ок               |              |   |   |   |
| 4.       | Send <b>DC904180</b> and verify from the resulting (14,4) packet that packet 120 (dec) is nowenabled (i.e. present in the list)   | 120 present      |              |   |   |   |
| 5.       | From TMPH verify that packets with SPID = 264000999 are cyclically arriving on the CCS  | Packets Arriving |              |   |   |   |
| 6.       | Close LCL25, by sending DC25D170  | ок               |              | State of LCL #25 switches to ON                 |   |   |
| 7.       | Verify LCL25 closed: WM12B565 =   | ON               |              | ,   |   |   |
| 8.       | Record Current WM107565   | N/A              |              |   |   |   |

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| Step-No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks                          | Р | N |
|----------|--|---------------|--------------|----------------------------------|---|---|
| 9.       | Send HLC 5 to switch relays to LCL position DCT01170, DHT01170="CMD_ID_HLC5" | ОК            |              |                                  |   |   |
| 10.      | Verify Current WM107565 =  | 130-180 mA    |              | Current between 130-180mA        |   |   |
| 11.      | Send HLC 6 to switch relays to MCU position DCT01170, DHT01170="CMD_ID_HLC6" | ок            |              |                                  |   |   |
| 12.      | Verify Current WM107565 =  | 0 mA          |              | Current off                      |   |   |
| 13.      | Open LCL25, by sending DC25B170  | ок            |              | State of LCL #25 switches to OFF |   |   |
| 14.      | Verify LCL25 open: WM12B565 =  | OFF           |              |                                  |   |   |
|          | SMEC Nominal LL latch relay position verification complete                   |               |              |                                  |   |   |

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#### 7.2.6.2 Switch ON for SPIRE PRIME SMEC

The following will switch ON and configure SPIRE Prime instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1280 dec and 1282 decimal (these can be observed using TMPH with corresponding filter – note however a limited number of TMPHs should be running at one time).

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE is in REDY mode. When in REDY mode one parameter remains OOL (soft) namely SMD2V505 this is also expected.

| Step-No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks  | Р | N |
|----------|---|---------------|--------------|--|---|---|
| 1.       | On HPCCS start Packet History displays for the following APIDs:1280,1282  | ок            |              |  |   |   |
| 2.       | From the HPCCS test conductor console start the test script to power on SPIRE Prime: S102999SCVT031_ASDCFTSPIR_PWR_ON_P | IOK           |              | AND: ZAD07999,<br>ZAD14999<br>MIM:<br>LCL HERSCHEL |   |   |

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| Step-No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks       | Р | N |
|----------|--|---------------|--------------|---------------|---|---|
| 3.       | On HPCCS when prompted:  "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES  | YES           |              |               |   |   |
|          | If <b>YES</b> is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below. |               |              |               |   |   |
| 4.       | On HPCCS when prompted:  "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue"  Select OK  | ок            |              | AND: SA_1_559 |   |   |

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| Step-No. | Test-Step-Description  | Nominal Value                            | Actual Value | Remarks  | Р | N |
|----------|--|--|--------------|--|---|---|
| 5.       | If I-EGSE connected when prompted on HPCCS, perform check requested then select OK:  "Check IEGSE Time Consistent - OK to continue when RAL confirm" | ОК                                       |              |  |   |   |
| 6.       |  | Not refreshing Not incrementing OK       |              | Note: Two TC<br>failures on<br>SCR00500 are<br>expected<br>because HKTM<br>has been<br>stopped |   |   |
| 7.       |  | Refreshing @ 1Hz Incrementing by 1 @ 1Hz |              | AND: SA_1_559  |   |   |

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| Step- | No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks | Р | N |
|-------|-----|--|---------------|--------------|---------|---|---|
|       |     | Select OK to continue  | ОК            |              |         |   |   |
| 8.    |     | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT031_ASDCFTSPIR_PWR_ON_P it will prompt:  "Set Bus Profile Back to Original Setting?"  Select NO | NO            |              |         |   |   |
| 9.    |     | At the prompt:  "Bus Profile left unchanged"  Select OK to continue  | ок            |              |         |   |   |
| 10    | ).  | Verify HK TM packets are being received on APIDs 1280 & 1282   | ок            |              |         |   |   |
|       |     | SPIRE DPU & DRCU powered   |               |              |         |   |   |

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### 7.2.6.3 Procedure SPIRE-IST-COLD-FUNC-SCU-03-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU DC thermometry check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced  |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON   |
| Constraints           | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 8 minutes   |
| Pass/Fail Criteria    | SCU DC thermometry channels show temperature readings according to the actual instrument temperature  |

### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-<br>COLD-FUNC-SCU-03-P.tcl | _                | _                                     | _                                   |                     |
| 2    | Wait for the parameter BBFULLTYPE to get set to         | _                | _                                     | _                                   |                     |

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| Step | Description   | Parameter - Unit | Expected Values<br>Before/<br>During/<br>After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|--|---|---------------------|
|      | SCU_DC_Therm  |                  |  |   |                     |
| 3    | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT      | 0/0xFFFF/0xFFFF                                |   |                     |
| 4    | If the instrument is at He I                                  |                  | (All Values TBC)                               |   |                     |
|      | temperatures check the values of                              | PUMPHTRTEMP      | ~4.2K  |   |                     |
|      | SCU DC thermometry channels.                                  | PUMPHSTEMP       | ~4.4K  |   |                     |
|      |   | EVAPHSTEMP       | ~4.3K  |   |                     |
|      |   | SHUNTTEMP        | ~4.2K  |   |                     |
|      |   | EMCFILTEMP       | ~4.8K  |   |                     |
|      |   | SL0TEMP          | ~4.2K  |   |                     |
|      |   | PL0TEMP          | ~4.2K  |   |                     |
|      |   | OPTTEMP          | ~4.8K  |   |                     |
|      |   | BAFTEMP          | ~4.8K  |   |                     |
|      |   | BSMIFTEMP        | ~4.7K  |   |                     |
|      |   | SCAL2TEMP        | ~4.8K  |   |                     |
|      |   | SCAL4TEMP        | ~4.8K  |   |                     |
|      |   | SCALTEMP         | ~4.8K  |   |                     |
|      |   | SMECIFTEMP       | ~4.7K  |   |                     |
|      |   | SMECTEMP         | ~4.7K  |   |                     |
|      |   | BSMTEMP          | ~4.8K  |   |                     |
| 5    | If the instrument is at He II                                 |                  | (All Values TBC)                               |   |                     |

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| Step       | Description                      | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ | Success/<br>Failure |
|------------|----------------------------------|------------------|---------------------------------------|-------------------------------|---------------------|
|            | temperatures check the values of | PUMPHTRTEMP      | -/~4.6K                               | After                         |                     |
|            | SCU DC thermometry channels.     | PUMPHSTEMP       | -/~4.6K<br>-/~3.0K                    |                               |                     |
|            | doo bo thermometry charmers.     | EVAPHSTEMP       |                                       |                               |                     |
|            |                                  | SHUNTTEMP        | -/~3.0K                               |                               |                     |
|            |                                  |                  | -/~1.7K                               |                               |                     |
|            |                                  | EMCFILTEMP       | -/~4.6K                               |                               |                     |
|            |                                  | SLOTEMP          | -/~1.7K                               |                               |                     |
|            |                                  | PLOTEMP          | -/~1.7K                               |                               |                     |
|            |                                  | OPTTEMP          | -/~4.6K                               |                               |                     |
|            |                                  | BAFTEMP          | -/~4.6K                               |                               |                     |
|            |                                  | BSMIFTEMP        | -/~4.5K                               |                               |                     |
|            |                                  | SCAL2TEMP        | -/~4.6K                               |                               |                     |
|            |                                  | SCAL4TEMP        | -/~4.6K                               |                               |                     |
|            |                                  | SCALTEMP         | -/~4.6K                               |                               |                     |
|            |                                  | SMECIFTEMP       | -/~4.6K                               |                               |                     |
|            |                                  | SMECTEMP         | -/~4.6K                               |                               |                     |
|            |                                  | BSMTEMP          | -/~4.5K                               |                               |                     |
| 6          | Wait for the I-EGSE staff to     | <u> </u>         | _                                     |                               |                     |
|            | confirm the success or failure   |                  |                                       |                               |                     |
|            | of this test                     |                  |                                       |                               |                     |
| Test Resul | t (Pass/Fail):                   |                  |                                       |                               | L                   |

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### 7.2.6.4 Procedure SPIRE-IST-COLD-FUNC-SCU-06-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | SCU AC thermometry check   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON              |
| Final configuration   |  |
| Constraints           |  |
| Duration              | 2 minutes  |
| Pass/Fail Criteria    | SCU AC thermometry channel shows temperature readings according to the actual instrument temperature |

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### Procedure Steps:

| Step   | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|--------|---|------------------|---------------------------------------|---|---------------------|
| 1      | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-06-P.tcl                                       | _                | _                                     | -   |                     |
| 2      | Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm                              | _                | -                                     | <b> </b>  |                     |
| 3      | A few seconds later record the value of parameter SUBKSTAT                                | SUBKSTAT         | 0/1/1                                 |   |                     |
| 4      | If the instrument is at He I temperatures check the value of SCU AC thermometry channel.  | SUBKTEMP         | ~4K                                   |   |                     |
| 5      | If the instrument is at He II temperatures check the value of SCU AC thermometry channel. | SUBKTEMP         | ~1.7K                                 |   |                     |
| 6      | Wait for the I-EGSE staff to confirm the success or failure of this test                  | _                | _                                     | _   |                     |
| Test R | esult (Pass/Fail):  |                  | •                                     |   |                     |

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### 7.2.6.5 Procedure SPIRE-IST-COLD-FUNC-MCU-01-P

| Version                   | 2.4  |
|---------------------------|--|
| Date                      | 6th December 2007  |
| Purpose                   | MCU (PRIME) Boot Check   |
| Initial configuration     | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |
| Final configuration       |  |
|                           | MCU PRIME is booted.   |
| Preconditions             | SPIRE DRCU PRIME is switched ON  |
|                           | SPIRE MIB PRIME is imported in the CCS database.   |
|                           | CCS is up and running  |
| Language property and the | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                  |
| Duration                  | 5 minutes  |
| Pass/Fail criteria        | MCU voltages and board temperatures show expected 'ON' values                              |

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### **Procedure Steps:**

| Step | Description   | Parameter – Unit                                   | Expected Values Before/ During/ After  | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|--|--|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-01-P.tcl                     | _  | _  | _   |                     |
| 2    | Check that the MCU is booted up successfully                            | MCUBITSTAT   | 0/1/1  |   |                     |
| 3    | Check MCU HK parameter values and ensure that the values are refreshing | MCUP5V<br>MCUP14V<br>MCUM14V<br>MCUP15V<br>MCUM15V | ~ 5.0 ± 0.2V<br>~ 14.0 ± 0.5V<br>~ -14.0 ± 0.5V<br>~ 15.0 ± 0.5V<br>~ -15.0 ± 0.5V |   |                     |
|      |   | MCUMACTEMP<br>MCUSMECTEMP<br>MCUBSMTEMP            | ~300K<br>~300K<br>~300K  |   |                     |

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### 7.2.6,6 Procedure SPIRE-IST-COLD-FUNC-MCU-03-P

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU Nominal Science Contents Check  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.   |
| Final configuration   | Unchanged.  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified MCU HK parameters show expected increment   |

### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-03-P.tcl | MCUFRAMECNT      | 0/-/297                               |   |                     |

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### 7.2.6.7 Procedure SPIRE-IST-COLD-FUNC-SMEC-01-P

| Version               | 2.4  |  |  |  |  |
|-----------------------|--|--|--|--|--|
| Date                  | 6th December 2007  |  |  |  |  |
| Purpose               | SMEC (PRIME) Encoder/LVDT Sensor Check.  |  |  |  |  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |  |  |  |  |
|                       | MCU PRIME is booted.   |  |  |  |  |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |  |  |  |  |
|                       | MCU PRIME is booted. SMEC Encoder and LVDT are ON.   |  |  |  |  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |  |  |  |  |
|                       | SPIRE MCU PRIME is booted.   |  |  |  |  |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |  |  |  |  |
|                       | CCS is up and running  |  |  |  |  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |  |  |  |  |
| Duration              | 5 minutes  |  |  |  |  |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.                              |  |  |  |  |

#### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-<br>SMEC-01-P.tcl | _                | _                                   | _                                 |                     |
| 2    | Check that power to the SMEC LED and LVDT                | SMECENCPWR       | 0/-/1                               |                                   |                     |
|      | sensor is on   | SMECLVDTPWR      | 0/-/1                               |                                   |                     |

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### 7.2.6.8 Procedure SPIRE-IST-COLD-FUNC-SMEC-03-P

| Version               | 2.4   |  |  |
|-----------------------|---|--|--|
| Date                  | 6th December 2007   |  |  |
| Purpose               | SMEC (PRIME) Encoder Integrity Check.   |  |  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |  |  |
|                       | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.  |  |  |
| Final configuration   | Unchanged   |  |  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |  |  |
| Duration              | 5 minutes   |  |  |
| Pass/Fail criteria    | MCUENGSMECENCSIG1/2 increase as the encoder power is increased  |  |  |

### Procedure Steps:

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-03-P.tcl                     | _                | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 |                     |

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### 7.2.6.9 Procedure SPIRE-IST-COLD-FUNC-SMEC-02A-P

| Version               | 2.5  |  |  |  |
|-----------------------|--|--|--|--|
| Date                  | 3 <sup>rd</sup> July 2008  |  |  |  |
| Purpose               | Open the SMEC Launch Latch Prime (Unlatch it)  |  |  |  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |  |  |  |
|                       | MCU PRIME is booted and SMEC is latched  |  |  |  |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |  |  |  |
|                       | MCU PRIME is booted and SMEC is ON and Unlatched   |  |  |  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |  |  |  |
|                       | SPIRE MCU PRIME is booted.   |  |  |  |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |  |  |  |
|                       | CCS is up and running  |  |  |  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |  |  |  |
|                       | The Herschel Cryostat should be tilted horizontal  |  |  |  |
| Duration              | 20 minutes   |  |  |  |
| Pass/Fail criteria    | The SMEC latch is open.  |  |  |  |

**Procedure Steps:** 

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| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-02A-P.tcl                                    | _                | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test                 | _                | _                                   | _                                 |                     |
|      | The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  |                                     |                                   |                     |

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#### 7.2.6.10 Procedure SPIRE-IST-COLD-FUNC-SMEC-FFOFFSET-P

| Version               | 1.2   |
|-----------------------|---|
| Date                  | 10 <sup>th</sup> July 2008  |
| Purpose               | SMEC (PRIME) Open Loop Feed Forward Offset Test   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
|                       | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.  |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>SMEC PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 60 minutes  |
| Pass/Fail criteria    | Optimum SMEC Feed Forward Offset is determined  |

Procedure Steps:

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-FFOFFSET-P.tcl               | _                | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                 |                     |

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| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values<br>Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|--------------------------------------|---------------------|
| 3    | Based on the results of this test it may be necessary to set the SMEC FF Offset manually. |                  |                                     |                                      |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9055xxxx  • param 2 = 0                            | SMECFFOFFSET     | -/ - /xxxx                          |                                      |                     |
|      | I-EGSE staff will supply the 16-bit parameter value xxxx to this command.                 |                  |                                     |                                      |                     |
| 4    | Based on the results of this test it may be necessary to set the SMEC FF Gain manually.   |                  |                                     |                                      |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9054xxxx  • param 2 = 0                            | SMECFFGAIN       | -/ - /xxxx                          |                                      |                     |
|      | I-EGSE staff will supply the 16-bit parameter value xxxx to this command.                 |                  |                                     |                                      |                     |

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| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 5    | A manual reset of the encoder signals 1 and 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS: |                  |                                     |                                   |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9058xxxx  • param 2 = 0   | SMECENCSIG1OFF   | -/-/∼ Commanded<br>Value            |                                   |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x905Axxxx  • param 2 = 0   | SMECENCSIG2OFF   | -/-/~ Commanded<br>Value            |                                   |                     |
|      | The 16 bit parameters xxxx will be provided by I-EGSE staff  |                  |                                     |                                   |                     |
| 6    | Note that it may be necessary to repeat this test to fine tune the Feed Forward Offset   | _                | _                                   | _                                 |                     |
|      | The I-EGSE staff will need to analyse the test data before continuing the test sequence.   |                  |                                     |                                   |                     |

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### 7.2.6.11 Procedure SPIRE-IST-COLD-FUNC-SMEC-04A-P

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008  |
| Purpose               | SMEC (PRIME) Open Loop Positioning Test.   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON   |
|                       | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.   |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 30 minutes   |
| Pass/Fail criteria    | SMEC moves to the commanded positions  |

#### **Procedure Steps:**

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| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-04A-P.tcl                                    | _                | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test                 | _                | _                                   | _                                 |                     |
|      | The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  |                                     |                                   |                     |

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#### 7.2.6.12 Procedure SPIRE-IST-COLD-FUNC-SMEC-09-P

| Version                                  | 2.5   |
|--|---|
| Date                                     | 3 <sup>rd</sup> July 2008   |
| Purpose                                  | SMEC (PRIME) Open Loop Scan Test.   |
| Initial configuration                    | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| 11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1 | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.  |
| Final configuration                      | Unchanged   |
| Preconditions                            | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>SMEC PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration                                 | 30 minutes  |
| Pass/Fail criteria                       | SMEC performs a scan between the commanded positions  |

| Enter D  | Date/Time:        | Sign Off: |       |     |
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### **Procedure Steps:**

|   | Parameter – Unit   | Expected Values Before/During/After   | Actual Values Before/During/After   | Success/<br>Failure   |
|---|--|---|---|---|
| A manual reset of the encoder signals 1 and 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS:  SPIRE_SEND_DRCU_COMMAND  param 1 = 0x9058xxxx |  |   |   |   |
| <ul> <li>param 2 = 0</li> <li>SPIRE_SEND_DRCU_COMMAND</li> <li>param 1 = 0x905Axxxx</li> <li>param 2 = 0</li> </ul>   | SMECENCSIG1OFF   | -/-/∼ Commanded<br>Value  |   |   |
|   | SMECENCSIG2OFF   | -/-/~ Commanded<br>Value  |   |   |
| The 16 bit parameters xxxx will be provided by I-EGSE staff   |  |   |   |   |
| Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-09-P.tcl  | _  | _   | _   |   |
| Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence.                                       | _  | _   | _   |   |
|   | 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS: SPIRE_SEND_DRCU_COMMAND | 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS:  SPIRE_SEND_DRCU_COMMAND | 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS:  SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9058xxxx  • param 2 = 0  SMECENCSIG1OFF  -/-/~ Commanded  Value  SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x905Axxxx  • param 2 = 0  SMECENCSIG2OFF  -/-/~ Commanded  Value  The 16 bit parameters xxxx will be provided by I-EGSE staff  Execute TCL script SPIRE-IST-COLD- FUNC-SMEC-09-P.tcl  Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. | 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS:  SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9058xxxx  • param 2 = 0  SMECENCSIG10FF  -/-/~ Commanded  Value  SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x905Axxxx  • param 2 = 0  SMECENCSIG20FF  -/-/~ Commanded  Value  The 16 bit parameters xxxx will be provided by I-EGSE staff  Execute TCL script SPIRE-IST-COLD- FUNC-SMEC-09-P.tcl  Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. |

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### 7.2.6.13 Procedure SPIRE-IST-COLD-FUNC-SMEC-07-P

| Version   | 2.5  |
|---|--|
| Date  | 3 <sup>rd</sup> July 2008  |
| Purpose   | SMEC (PRIME) Close Loop Scan Test.   |
| Initial configuration                           | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |
|   | and MCU PRIME is booted. SMEC Encoder and LVDT are ON.                                     |
| Final configuration                             | SMEC is in closed loop   |
| Preconditions                                   |  |
| TRACT COST OF LOUR COLOR                        | SPIRE MCU PRIME is booted.   |
|   | SPIRE MIB PRIME is imported in the CCS database.   |
| 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1        | CCS is up and running  |
| <ul> <li>Established on Sedente of S</li> </ul> | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                  |
| A THE PERSONAL PROPERTY.                        | The Herschel Cryostat should be tilted horizontal  |
| Duration  | 60 minutes   |
| Pass/Fail criteria                              | SMEC performs a scan between the commanded positions and the loop remains closed           |

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| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Before this test a SMEC calibration table on the I-EGSE may have to be changed. Please confirm with the I-EGSE staff before continuing with the next test.        | _                | _                                   | _                                 |                     |
| 2    | Execute TCL script SPIRE-IST-COLD-<br>SMEC-INIT-P.tcl   | SMECLOOPMODE     | 6/-/1                               |                                   |                     |
| 3    | Execute TCL script SPIRE-IST-COLD-<br>FUNC-SMEC-07-P.tcl  | _                | _                                   | _                                 |                     |
| 4    | Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. | _                | _                                   | _                                 |                     |

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### 7.2.6.14 Procedure SPIRE-IST-COLD-FUNC-SMEC-04B-P

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008  |
| Purpose               | SMEC (PRIME) Close Loop Positioning Test.  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON   |
| 445 C 485 W 200       | and MCU PRIME is booted. SMEC Encoder and LVDT are ON. SMEC is in closed loop.   |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 20 minutes   |
| Pass/Fail criteria    | SMEC moves to the commanded positions and remains in closed loop   |

**Procedure Steps:** 

| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-<br>FUNC-SMEC-04B-P.tcl   | SMECLOOPMODE     | 1/1/1                               |                                   |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. | _                | _                                   | _                                 |                     |

Test Result (Pass/Fail):

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#### 7.2.6.15 Procedure SPIRE-IST-COLD-FUNC-SMEC-LVDT-P

| Version               | 1.1  |  |  |
|-----------------------|--|--|--|
| Date                  | 10 <sup>th</sup> July 2008   |  |  |
| Purpose               | SMEC (PRIME) Backup LVDT Close Loop Check  |  |  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON   |  |  |
|                       | and MCU PRIME is booted. SMEC Encoder and LVDT are ON. SMEC is in closed loop.   |  |  |
| Final configuration   | Unchanged  |  |  |
| Preconditions         | <ul> <li>SPIRE DRCU PRIME is switched ON</li> <li>SPIRE MCU PRIME is booted.</li> <li>SPIRE MIB PRIME is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |  |  |
| Duration              | 90 minutes   |  |  |
| Pass/Fail criteria    | SMEC remains in closed loop on LVDT  |  |  |

**Procedure Steps:** 

| Step | Description                               | Parameter – Unit | Expected Values     | Actual Values       | Success/ |
|------|---|------------------|---------------------|---------------------|----------|
|      |   |                  | Before/During/After | Before/During/After | Failure  |
| 1    | Manual commanding may be necessary        |                  |                     | _                   |          |
|      | during this test. Details to be specified |                  |                     |                     |          |
|      | Change downlink data rate to 1.5 Mbps     |                  |                     |                     |          |
|      | Send command                              |                  |                     |                     |          |
|      | DC27F170                                  |                  |                     |                     |          |

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| Step   | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test. The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  | _                                   |                                   | , and o             |
| Test R | esult (Pass/Fail):   |                  | `                                   |                                   |                     |

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#### 7.2.6.16 SMEC Microvibration Pre-Test Configuration

| Step-No. | Test-Step-Description  | Nominal<br>Value                                    | Tolerance | Actual<br>Value | Remarks | Р | N |
|----------|--|---|-----------|-----------------|---------|---|---|
|          | ACMS Switch ON   |   |           |                 |         |   |   |
| 1        | From Test Conductor Console, execute script:  'A102109SPVT003_ACMS_CONFIG25' | ОК  |           |                 |         |   |   |
| 2        | At the following main menu:  HERSCHEL/PLANCK - MAIN MENU 1.0 - INIT PHASE    | Select option<br>1 and click<br>OK then<br>Continue |           |                 |         |   |   |
|          | 6. ACMS SCOE Configuration   |   |           |                 |         |   |   |
|          | 77. JUMP to another Entry Point  |   |           |                 |         |   |   |
|          | 88. Continue ACMS_CONFIG to menu 2.0 STBY/PRE-SEP 99. Terminate ACMS_CONFIG  |   |           |                 |         |   |   |

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| Step-No. | Test-Step-Description  | Nominal<br>Value                             | Tolerance | Actual<br>Value | Remarks  | P | N |
|----------|--|--|-----------|-----------------|--|---|---|
|          | select the point number 1 and press the relevant button: "CONTINUE".   |  |           |                 |  |   |   |
| 3        | Sequence pops-up asking for the input file. Write SPIRE_UV and press OK  | Write "SPIRE_UV" and press OK                |           |                 |  |   |   |
| 4        | At sequence completion, the same main menu appears.  Select point number 6 to switch on the ACMS SCOE then click OK, Continue  | Select Option<br>6 and click<br>OK, Continue |           |                 | ACMS SCOE is switched-on in 'executing' mode.  Note: Until ACC is not fully powered-on, some WARNING ALARMS might come down in the On-Board Event History. |   |   |
| 5        | On AND YA001939 'AMCS SCOE - AS_PSEUDO 1 of 1' check that parameters:  YMACT939 (ACMS SCOE state)  YMASE939 (Simulator stata)  YMAMS939 (MILFE state)  YMAUS939 (UIFE state)  Turned to: 'executing' | Parameters<br>set to<br>'executing'          |           |                 |  |   |   |

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| Step-No. | Test-Step-Description   | Nominal<br>Value                             | Tolerance | Actual<br>Value | Remarks   | Р | N |
|----------|---|--|-----------|-----------------|---|---|---|
| 6        | At sequence completion, the same main menu appears.  Select point number 4 to switch on the ACC then click OK,  Continue    | Select Option<br>4 and click<br>OK, Continue |           |                 | Expected Out of Limit of AEYYY109 (synchronisation).  ACC may become INVALID for a short time.  SPR 245: Out of Limit of HKA_ANTHx_Data |   |   |
| 7        | From a Packet History tool, select filter 'APID 512' and check that ACMS HK and ETM is correctly flowing down.              | ок   |           |                 |   |   |   |
| 8        | From On-Board Event History Display check that no 'NO-GO' are present.  | ок   |           |                 |   |   |   |
| 9        | From ACMS MASTER (ACMS_CONFIG25) sequence, move to Menu 3 (if not already there) with option 88.  Click OK and then Confirm | ок   |           |                 |   |   |   |
| 10       | From ACMS_CONFIG25, Menu 3, select option 1:  'Override Separation Flag' then Click button OK and then Confirm              | Select 1, then<br>OK and<br>Continue         |           |                 | ACC goes in SAM<br>Mode   |   |   |

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| Step-No. | Test-Step-Description   | Nominal<br>Value                     | Tolerance | Actual<br>Value | Remarks  | Р | N |
|----------|---|--------------------------------------|-----------|-----------------|--|---|---|
| 11       | Sequence A102109SPVT034_ACMS_SAM_MON shall pop-up following the opening of separation straps, at prompt:  'Do you want to continue to monitor Sam Sun Pointing mode?  Enter your choice: no Then click OK | no                                   |           | value           | ACMS SAM Point<br>Coarse is reached              |   |   |
| 12       | From ACMS_CONFIG25 Master Sequence, Menu 4.0, select option 6 'Transition to OCM'  Click OK and then Confirm  | Select 6, then<br>OK and<br>Continue |           |                 |  |   |   |
| 13       | Sequence 'A102109SPVT036_ACMS_STR_ON' shall pop-up. At prompt:  'Do You want to change current Str in Use' check if STR already selected is the correct one and answer  'no'                              | no                                   |           |                 | STR-1 is switched ON<br>and put in ATFAD<br>mode |   |   |
| 14       | When scripts are completed, From ACMS synoptic check that ACC Mode is turned to: 'OCM pnt fine'   | ок                                   |           |                 |  |   |   |
|          | Synchronise CCS Time With ETS for Accelerometer Measurement Timing  |                                      |           |                 |  |   |   |

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| Step-No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks | P | N |
|----------|--|------------------|-----------|-----------------|---------|---|---|
| 15       | For correlation of test results, record time of ETS Accelerometer Test Equipment and at the same time record the CCS time: |                  |           |                 |         |   |   |
|          | ETS Time (Accelerometer Measurement T.E. Clock):   |                  |           |                 |         |   |   |
|          | CCS Time:  |                  |           |                 |         |   |   |
| 16       | If not already active request ETS to start accelerometer acquisitions as per Appendix 2                                    |                  |           |                 |         |   |   |

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# 7.2.6.17 Reaction Wheel Operation for Variable Frequency Microvibration

This section should be performed in parallel with section 7.2.6.18 step 2. It takes approximately 40 mins to run.

| Step | Reaction Wheel Activation   | Nominal Value | Tolerance | Actual Value | Remark | Р | N |
|------|---|---------------|-----------|--------------|--------|---|---|
| 1    | From Test Conductor Console, execute script:  | ок            |           |              |        |   |   |
|      | 'A102109SPVT213_ACMS_RWL_SPIRE_uVIB'  |               |           |              |        |   |   |
| 2    | Setup the 'TM Plotting Tool' to follow RWL spinning for the followiing monitoring parameters: |               |           |              |        |   |   |
|      | AEWR1002  |               |           |              |        |   |   |
|      | AEWR2002  | ок            |           |              |        |   | , |
|      | AEWR3002  |               |           |              |        |   |   |
|      | AEWR4002  |               |           |              |        |   |   |
| 3    | At the following prompt:  |               |           |              |        |   |   |
|      | 'Positive Spin. Click OK'   |               |           |              |        |   |   |
|      | Check from ACMS Synoptic that RWL 1-2-3-4 are ON. Then Click OK to start positive spinning    | Click OK      |           |              |        |   |   |
|      | On the 'TM Plotting Tool' follow RWL positive spinning  |               |           |              |        |   |   |
| 4    | At the following prompt:  |               |           |              |        |   |   |
|      | 'Negative Spin. Click OK'   | Click OK      |           |              |        |   |   |
|      | Click OK to start negative spinning   |               |           |              |        |   |   |

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| Step | Reaction Wheel Activation                              | Nominal Value | Tolerance | Actual Value | Remark | P | N |
|------|--|---------------|-----------|--------------|--------|---|---|
|      | On the 'TM Plotting Tool' follow RWL negative spinning |               |           |              |        |   |   |
| 6    | At the following prompt:                               |               |           |              |        |   |   |
|      | 'Click OK to spin-down RWL to 0 [Nms]'                 | Click OK      |           |              |        |   |   |
|      | Click OK to bring RWLs to 0 [Nms]                      |               |           |              |        |   |   |

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# 7.2.6.18 SMEC Variable Frequency Microvibration Test

The previous section (7.2.6.17) must be performed in parallel with this section step 2, which is assumed to take around 40 mins to run. Make sure that for this micro-vibration test the accelerometer acquisition has been activated before continuing.

| Description  | Parameters  | Expected Values   | Actual<br>Values   | Success/<br>Failure   |
|--|---|---|--|---|
| Execute stand alone script SPIRE-IST-SMEC-RAMP-MICROVIBRATION.tcl Generate high rate MCU engineering data – we are looking for fluctuations in SMEC velocity Set SMEC continuously scanning at 0.5 mm/s (TBC) over full range Number of scans set to make this a 1 hour test | N/A   | N/A   | N/A  | Tanare  |
| When given the go-ahead from SPIRE I-EGSE Operator, perform the following step   |   |   |  |   |
| Perform Section 7.2.6.17 to start reaction wheel operation i.a.w. agreed profile (see Appendix 2)  | N/A   | N/A   | N/A  |   |
|  | Execute stand alone script SPIRE-IST-SMEC-RAMP-MICROVIBRATION.tcl Generate high rate MCU engineering data – we are looking for fluctuations in SMEC velocity Set SMEC continuously scanning at 0.5 mm/s (TBC) over full range Number of scans set to make this a 1 hour test  When given the go-ahead from SPIRE I-EGSE Operator, perform the following step  Perform Section 7.2.6.17 to start reaction wheel operation i.a.w. | Execute stand alone script SPIRE-IST-SMEC-RAMP- MICROVIBRATION.tcl  Generate high rate MCU engineering data – we are looking for fluctuations in SMEC velocity  Set SMEC continuously scanning at 0.5 mm/s (TBC) over full range Number of scans set to make this a 1 hour test  When given the go-ahead from SPIRE I-EGSE Operator, perform the following step  Perform Section 7.2.6.17 to start reaction wheel operation i.a.w.  N/A | Execute stand alone script SPIRE-IST-SMEC-RAMP- MICROVIBRATION.tcl Generate high rate MCU engineering data – we are looking for fluctuations in SMEC velocity Set SMEC continuously scanning at 0.5 mm/s (TBC) over full range Number of scans set to make this a 1 hour test  When given the go-ahead from SPIRE I-EGSE Operator, perform the following step  Perform Section 7.2.6.17 to start reaction wheel operation i.a.w. N/A | Execute stand alone script SPIRE-IST-SMEC-RAMP- MICROVIBRATION.tcl Generate high rate MCU engineering data – we are looking for fluctuations in SMEC velocity Set SMEC continuously scanning at 0.5 mm/s (TBC) over full range Number of scans set to make this a 1 hour test  When given the go-ahead from SPIRE I-EGSE Operator, perform the following step  Perform Section 7.2.6.17 to start reaction wheel operation i.a.w.  N/A  N/A  N/A  N/A  N/A |

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#### Reaction Wheel Operation for Spot Frequency Microvibration 7.2.6.19

This section should be performed in parallel with section 7.2.6.20 step 3. It takes approximately 40 mins to run.

| Step | Reaction Wheel Activation                               | Nominal Value | Tolerance | Actual Value | Remark | Þ | N |
|------|---|---------------|-----------|--------------|--------|---|---|
| 1    | From Test Conductor Console, execute script:            | OK            |           |              |        |   |   |
|      | 'A102109SPVT213_ACMS_RWL_SPIRE_uVIB'                    |               |           |              |        |   |   |
| 2    | Setup the 'TM Plotting Tool' to follow RWL spinning for |               |           |              |        |   |   |
|      | the followiing monitoring parameters:                   |               |           |              |        |   |   |
|      | AEWR1002  |               |           |              |        |   |   |
|      | AEWR2002  | <del>OK</del> |           |              |        |   |   |
|      | AEWR3002  |               |           |              |        |   |   |
|      | AEWR4002  |               |           |              |        |   |   |
| 3    | At the following prompt:                                |               |           |              |        |   |   |
|      | 'Positive Spin. Click OK'                               | Click OK      |           |              |        |   |   |
|      | Check from ACMS Synoptic that RWL 1-2-3-4 are ON.       | Olloic Orc    |           |              |        |   |   |
|      | Then Click OK to start positive spinning                |               |           |              |        |   |   |
|      | On the 'TM Plotting Tool' follow RWL positive spinning  |               |           |              |        |   |   |
| 4    | At the following prompt:                                |               |           |              |        |   |   |
|      | 'Negative Spin. Click OK'                               | Click OK      |           |              |        |   |   |
|      | Click OK to start negative spinning                     |               |           |              |        |   |   |

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| Step | Reaction Wheel Activation                              | Nominal Value | Tolerance | Actual Value | Remark | P | N |
|------|--|---------------|-----------|--------------|--------|---|---|
|      | On the 'TM Plotting Tool' follow RWL negative spinning |               |           |              |        |   |   |
| 6    | At the following prompt:                               |               |           |              |        |   |   |
|      | 'Click OK to spin-down RWL to 0 [Nms]'                 | Click OK      |           |              |        |   |   |
|      | Click OK to bring RWLs to 0 [Nms]                      |               |           |              |        |   |   |

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# 7.2.6.20 SMEC Spot Frequency Microvibration Test

The previous section (7.2.6.17) must be performed in parallel with this section step 3, which is assumed to take around 40 mins to run. Make sure that for this micro-vibration test the accelerometer acquisition has been activated before continuing.

| In HPCCS execute test script SPIRE-IST-SMEC-SPOT- IICROVIBRATION is enerate high rate data – we are looking for fluctuations in SMEC elocity  | N/A   | N/A   | N/A   |   |
|---|---|---|---|---|
| can SMEC at 0.1 mm/s over full range for four scans   |   |   |   |   |
| he following 2 steps shall be run in parallel   |   |   |   |   |
| erform Section 7.2.6.17 to start reaction wheel operation i.a.w. greed profile (see Appendix 2)   | N/A   | N/A   | N/A   |   |
| On HPCCS execute test script SPIRE-IST-SMEC-SPOT- AICROVIBRATION Senerate high rate data – we are looking for fluctuations in SMEC elocity Scan SMEC at 0.1 mm/s over full range for four scans | N/A   | N/A   | N/A   |   |
| e general series  | rform Section 7.2.6.17 to start reaction wheel operation i.a.w. reed profile (see Appendix 2) HPCCS execute test script SPIRE-IST-SMEC-SPOT- CROVIBRATION Procrate high rate data — we are looking for fluctuations in SMEC | rform Section 7.2.6.17 to start reaction wheel operation i.a.w. reed profile (see Appendix 2)  HPCCS execute test script SPIRE-IST-SMEC-SPOT- CROVIBRATION enerate high rate data — we are looking for fluctuations in SMEC locity an SMEC at 0.1 mm/s over full range for four scans | rform Section 7.2.6.17 to start reaction wheel operation i.a.w. reed profile (see Appendix 2)  HPCCS execute test script SPIRE-IST-SMEC-SPOT- CROVIBRATION enerate high rate data — we are looking for fluctuations in SMEC locity an SMEC at 0.1 mm/s over full range for four scans | rform Section 7.2.6.17 to start reaction wheel operation i.a.w. reed profile (see Appendix 2)  HPCCS execute test script SPIRE-IST-SMEC-SPOT- CROVIBRATION enerate high rate data — we are looking for fluctuations in SMEC locity an SMEC at 0.1 mm/s over full range for four scans |

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# 7.2.6.21 Microvibration Post-Test Configuration

| Step-No.   | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks | Р | N |
|------------|--|------------------|-----------|-----------------|---------|---|---|
|            | ACMS Switch OFF  |                  |           | Talue           | Remarks |   |   |
| 7.5.5.12.1 | Ensure RWLs have spun down before switching OFF  |                  |           |                 |         |   |   |
| 7.5.5.12.2 | From ACMS_CONFIG25 main menu:  • Select the point number 99  and confirm the selection pressing the relevant button  "CONTINUE". | Continue         |           |                 |         |   |   |
| 7.5.5.12.3 | The following menu will appear:  HERSCHEL/PLANCK - MAIN MENU 9.0 - ACMS OFF PHASE  ===================================           | Continue         |           |                 |         |   |   |
| 7.5.5.12.4 | Check the "ACMS_OFF" Test Sequence has been successfully ended.  | ОК               |           |                 |         |   |   |

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| Step-No.   | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Remarks | Р | N |
|------------|--|------------------|-----------|-----------------|---------|---|---|
| 7.5.5.12.5 | By the same above menu,  |                  |           |                 |         |   |   |
|            | select the point number 99 to end the ACMS_CONFIG25 Master Sequence". Click OK to Confirm                                    | ОК               |           |                 |         |   |   |
|            | Re-Synchronise Time With ETS for Accelerometer Measurement Timing  |                  |           |                 |         |   |   |
| 7.5.5.12.6 | For correlation of test results re-record time of ETS Accelerometer Test Equipment and at the same time record the CCS time: |                  |           |                 |         |   |   |
|            | ETS Time (Accelerometer Measurement T.E. Clock):   |                  |           |                 |         |   |   |
|            | CCS Time:  |                  |           |                 | (1)     |   |   |
| 7.5.5.12.7 | Notify ETS that accelerometer acquisitions can be stopped  |                  |           | 0.00            |         |   |   |

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# 7.2.6.22 Procedure SPIRE-IST-COLD-FUNC-SMEC-02B-P

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008  |
| Purpose               | Close the SMEC Launch Latch (Latch it)   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |
|                       | and MCU PRIME is booted and SMEC is ON and unlatched                                       |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON |
|                       | and MCU PRIME is booted and SMEC is ON and Latched   |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MCU PRIME is booted.   |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
| -                     | CCS is up and running  |
|                       | <ul> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul>              |
| Duration              | 30 minutes   |
| Pass/Fail criteria    | The SMEC latch is closed   |

# **Procedure Steps:**

| Step   | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values<br>Before/During/After | Success/ |
|--------|--|------------------|-------------------------------------|--------------------------------------|----------|
| 1      | Execute TCL script SPIRE-IST-COLD-<br>FUNC-SMEC-02B-P.tcl                | _                | —                                   | — Beiore/During/After                | Failure  |
| 2      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                    |          |
| Test F | Result (Pass/Fail):  |                  |                                     |                                      |          |

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# 7.2.6.23 Procedure SPIRE-IST-COLD-SMEC-OFF-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | SMEC (PRIME) Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
| LINE SCHOOL STORY     | MCU PRIME is booted. SMEC Encoder and LVDT are ON.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted. SMEC Encoder and LVDT are OFF.  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MCU PRIME is booted.   |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration              | 3 minutes  |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.                             |

**Procedure Steps:** 

| Step | Description                                 | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute SPIRE-IST-COLD-SMEC-OFF-P.tcl       |                  |                                     |                                   | ranare              |
| 2    | Check that the power to the SMEC sensors is | SMECENCPWR       | 1/-/0                               |                                   |                     |
|      | switched off                                | SMECLVDTPWR      | 1/-/0                               |                                   |                     |

| - 1      |                   |           |   |
|----------|-------------------|-----------|---|
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#### 7.2.6.24 Procedure SPIRE-IST-COLD-MCU-OFF-P

| Version               | 2.4  |
|-----------------------|--|
| Date                  | 6th December 2007  |
| Purpose               | MCU PRIME Switch OFF   |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is booted.   |
| Final configuration   | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and |
|                       | MCU PRIME is OFF.  |
| Preconditions         | SPIRE DRCU PRIME is switched ON  |
|                       | SPIRE MCU PRIME is ON.   |
|                       | SPIRE MIB PRIME is imported in the CCS database.   |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                      |
| Duration              | 5 minutes  |
| Pass/Fail criteria    | Specified MCU HK Parameter shows expected value.   |

# **Procedure Steps:**

| Step   | Description                          | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------|--------------------------------------|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1      | Execute SPIRE-IST-COLD-MCU-OFF-P.tcl |                  |                                     | _                                 |                     |
| 2      | Check that the MCU is switched off   | MCUBITSTAT       | 1/-/0                               |                                   |                     |
| Test R | esult (Pass/Fail):                   |                  |                                     |                                   | <u> </u>            |

| Enter Date/Time:           | Sign Off: |               |    |
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# 7.2.6.25 Procedure SPIRE-IST-COLD-SCU-OFF-P

| Version                                  | 2.4   |
|--|---|
| Date                                     | 6th December 2007   |
| Purpose                                  | SCU PRIME Switch OFF  |
| Initial configuration                    | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON. |
| Final configuration                      | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is OFF |
| Preconditions                            | SPIRE DRCU PRIME is switched ON   |
|  | <ul> <li>SPIRE MIB PRIME is imported in the CCS database.</li> </ul>                        |
| 1000 A A A A A A A A A A A A A A A A A A | CCS is up and running   |
|  | <ul> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul>               |
| Duration                                 | 5 minutes   |
| Pass/Fail criteria                       | Specified SCU HK Parameters show expected value.  |

### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-SCU-OFF-P.tcl               | _                | _                                   |                                   | ranare              |
| 2    | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT      | 0xFFFF/-/0                          |                                   |                     |
| 3    | A few seconds later record the value of parameter SUBKSTAT    | SUBKSTAT         | 1/-/0                               |                                   |                     |

| Enter D  | ate/Time:     | Sign Off: |      |     | ٦ |
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# 7.2.6.26 Switch OFF After SPIRE PRIME SMEC

| Step- | Test-Step-Description  | Nominal Value | Actual Value | Remarks | Р | N |
|-------|--|---------------|--------------|---------|---|---|
| 8.    | From the HPCCS test conductor console start the test script to power OFF SPIRE Prime:  \$102999SCVT032_ASDCFTSPIR_PWR_OFF_P                      | ок            |              |         |   |   |
| 9.    | On HPCCS when prompted:  "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES | YES           |              |         |   |   |
|       | If <b>YES</b> is selected the test script will go on to automatically power off all SPIRE warm units.  |               |              |         |   |   |

|                  | 0: 011    |      |
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| Step-<br>No. | Test-Step-Description   | Nominal Value    | Actual Value | Remarks       | Р | N            |
|--------------|---|------------------|--------------|---------------|---|--------------|
|              | Note that during Switch OFF of SPIRE the following (5,2) and (5,4) event messages on APID 1280 may be expected and do not indicate a problem: |                  |              |               |   |              |
|              | e) EVID 1313 No_MCU_Response_Error f) EVID 21773 ALARM_LSMCU_DEAD   |                  |              |               |   |              |
|              | However, be aware that if FDIR is enabled for SPIRE in the CDMU then this may trigger an OBCP   |                  |              |               |   |              |
|              | On HPCCS when prompted:   |                  |              | AND: SA_1_559 |   | -            |
|              | "Check Telemetry No Longer Updating - OK to continue"   |                  |              |               |   |              |
| 10.          | Check that parameters:  |                  |              |               |   |              |
|              | THSK  | Not refreshing   |              |               |   |              |
|              | TM2N  | Not incrementing |              |               |   |              |
| 11.          | Select OK to continue   | OK               |              |               |   | <del> </del> |

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| Step- | Test-Step-Description   | Nominal Value | Actual Value | Remarks | Р | N |
|-------|---|---------------|--------------|---------|---|---|
| 12.   | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT032_ASDCFTSPIR_PWR_OFF_P it will prompt: |               |              |         |   |   |
|       | "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"   |               |              |         |   |   |
| 13.   | Select OK to continue   | ОК            |              |         |   |   |
| 14.   | On HPCCS stop Packet History displays for the following APIDs:1280,1282   | ок            |              |         |   |   |
| :     | SPIRE PRIME OFF   |               |              |         |   |   |

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#### 7.2.6.27 Verify Redundant Latch Command Relay Status

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Verify launch lock relays are positioned to allow SMEC launch lock to be unlatched.

| Step-No. | Test-Step-Description   | Nominal Value    | Actual Value | Remarks   | Р  | N |
|----------|---|------------------|--------------|---|--|---|
|          | All TCs to be sent from the Manual Command Stack  |                  |              |   |  |   |
| 1,       | Send <b>DC904180</b> and verify from the resulting (14,4) packet that packet 120 (dec) is not already enabled (i.e. NOT present in the list). If present skip steps 2 – 4 | 120 not present  |              | Step 1 to 5 only<br>required on<br>CDMS ASW 3.4 |  |   |
| 2.       | Send <b>ZCB00999</b> to allocate new diagnostic packet  | ок               |              |   |  |   |
| 3.       | Send <b>DC900180</b> with repeater value 1 and parameters: DH019180 = 26, DH020180=120  | ок               |              |   |  |   |
| 4.       | Send <b>DC904180</b> and verify from the resulting (14,4) packet that packet 120 (dec) is nowenabled (i.e. present in the list)   | 120 present      |              |   |  |   |
| 5.       | From TMPH verify that packets with SPID = <b>264000999</b> are cyclically arriving on the CCS   | Packets Arriving |              |   |  |   |
| 6.       | Close LCL26, by sending DC26D170  | ок               |              | State of LCL #26 switches to ON                 |  |   |
| 7.       | Verify LCL26 closed: WMA2B565 =   | ON               |              | SWILCHES IO ON                                  | <del>                                     </del> |   |
| 8.       | Record Current WMA07565   | N/A              |              |   |  |   |
| 9.       | Send HLC 5 to switch relays to LCL position DCT01170, DHT01170="CMD_ID_HLC21"   | ОК               |              |   |  |   |

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| Step-No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks                          | Р | N |
|----------|---|---------------|--------------|----------------------------------|---|---|
| 10.      | Verify Current <b>WMA07565</b> =  | 130-180 mA    |              | Current between 130-180mA        |   |   |
| 11.      | Send HLC 6 to switch relays to MCU position DCT01170, DHT01170="CMD_ID_HLC22" | ок            |              |                                  |   |   |
| 12.      | Verify Current WMA07565   | 0 mA          |              | Current off                      |   |   |
| 13.      | Open LCL26, by sending DC26B170   | ок            |              | State of LCL #26 switches to OFF |   |   |
| 14.      | Verify LCL26 open: WMA2B565 =   | OFF           |              |                                  |   |   |
|          | SMEC Redundant LL latch relay position verification complete                  |               |              |                                  |   |   |

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#### 7.2.6.28 Switch ON for SPIRE REDUNDANT SMEC

The following will switch ON and configure SPIRE Redundant instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1281 dec and 1283 decimal (these can be observed using TMPH with corresponding filter – note however a limited number of TMPHs should be running at one time).

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE is in REDY mode. When in REDY mode one parameter remains OOL (soft) namely SMD2V505 this is also expected.

| Step-No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks  | P | N |
|----------|--|---------------|--------------|--|---|---|
| 11.      | On HPCCS start Packet History displays for the following APIDs:1281,1283   | ОК            |              |  |   |   |
| 12.      | From the HPCCS test conductor console start the test script to power on SPIRE Redundant:  S102999SCVT033_ASDCFTSPIR_PWR_ON_R | ок            |              | AND: ZAD07999,<br>ZAD14999<br>MIM:<br>LCL_HERSCHEL |   |   |

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| Step-No.    | Test-Step-Description   | Nominal Value | Actual Value | Remarks       | Р | N |
|-------------|---|---------------|--------------|---------------|---|---|
|             | On HPCCS when prompted:   |               |              |               |   |   |
| ·<br>·<br>· | "SPIRE Switch ON for Cold FT  |               |              |               |   |   |
| 40          | related tests in Hel/Hell   |               |              |               |   |   |
| 13.         | conditions only - Select NO to  | YES           |              |               |   |   |
|             | abort TS if not correct"  |               |              |               |   |   |
|             | Select YES  |               |              |               |   |   |
|             | If YES is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below. |               |              |               |   |   |
|             | On HPCCS when prompted:   |               |              | AND: SA_1_559 |   |   |
| 14.         | "Check Telemetry Updating<br>Correctly and OBT is Consistent<br>with CDMU - OK to continue"   | ок            |              |               |   |   |
|             | Select OK   |               |              |               |   |   |
| 15.         | If I-EGSE connected when prompted on HPCCS, perform check requested then select <b>OK</b> :   | ОК            |              |               |   |   |
|             | "Check IEGSE Time Consistent - OK to continue when RAL confirm"   |               |              |               |   |   |

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| Step-No. | Test-Step-Description                                 | Nominal Value           | Actual Value | Remarks               | P | N  |
|----------|---|-------------------------|--------------|-----------------------|---|----|
|          | On HPCCS when prompted:                               |                         |              | Note: Two TC          |   | +- |
|          | "Check Telemetry No Longer                            |                         |              | failures on           |   |    |
|          | Updating - OK to continue"                            |                         |              | SCR00500 are          |   |    |
|          | Check that parameters:                                |                         |              | expected because HKTM |   |    |
| 16.      |   |                         |              | has been              |   |    |
|          |   |                         |              | stopped               |   |    |
|          | THSK  | Not refreshing          |              |                       |   |    |
|          | TM2N  | Not incrementing        |              |                       |   |    |
|          | Select OK to continue                                 | ок                      |              |                       |   |    |
|          | On HPCCS when prompted:                               |                         |              | AND: SA_1_559         |   | +  |
|          | "Check Telemetry Updating Correctly - OK to continue" |                         |              |                       |   |    |
| 17.      | Check that parameters:                                |                         |              |                       |   |    |
|          | THSK  | Refreshing @ 1Hz        |              |                       |   |    |
|          | TM2N  | Incrementing by 1 @ 1Hz |              |                       |   |    |
|          | Select OK to continue                                 | ок                      |              |                       |   |    |

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| Step-No. | Test-Step-Description   | Nominal Value | Actual Value | Remarks | P | N |
|----------|---|---------------|--------------|---------|---|---|
| 18.      | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT033_ASDCFTSPIR_PWR_ON_R it will prompt:  "Set Bus Profile Back to Original Setting?" | NO            |              |         |   |   |
|          | Select NO   |               |              |         |   |   |
| 19.      | At the prompt:  "Bus Profile left unchanged"  Select OK to continue   | ОК            |              |         |   |   |
| 20.      | Verify HK TM packets are being received on APIDs 1281 & 1283  | ок            |              |         |   |   |
|          | SPIRE DPU & DRCU Redundant powered  |               |              |         |   |   |

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# 7.2.6.29 Procedure SPIRE-IST-COLD-FUNC-SCU-03-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU DC thermometry check  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced  |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and DC thermometry is ON   |
| Constraints           | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 8 minutes   |
| Pass/Fail Criteria    | SCU DC thermometry channels show temperature readings according to the actual instrument temperature  |

### Procedure Steps:

| Step | Description  | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/<br>Failure |
|------|--|------------------|---------------------------------------|-------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-<br>COLD-FUNC-SCU-03-R.tcl      | _                | _                                     | —                                   |                     |
| 2    | Wait for the parameter BBFULLTYPE to get set to SCU_DC Therm | _                | _                                     | _                                   |                     |

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| Step | Description  | Parameter - Unit   | Expected Values Before/ During/ After  | Actual Values Before/ During/ After | Success/<br>Failure |
|------|--|--|--|-------------------------------------|---------------------|
| 3    | A few seconds later record the value of parameter SCUTEMPSTAT                              | SCUTEMPSTAT  | 0/0xFFFF/0xFFFF  |                                     |                     |
| 4    | If the instrument is at He I temperatures check the values of SCU DC thermometry channels. | PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SLOTEMP PLOTEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCAL4TEMP SMECIFTEMP SMECTEMP BSMTEMP | (All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.8K ~4.8K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K ~4.8K |                                     |                     |
| 5    | If the instrument is at He II temperatures check the values of                             |  | (All Values TBC)<br>-/~4.6K  |                                     |                     |

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| Step      | Description                    | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/ | Success/<br>Failure |
|-----------|--------------------------------|------------------|---------------------------------------|--|---------------------|
|           | 00110011                       |                  |                                       | After                                  |                     |
|           | SCU DC thermometry channels.   | PUMPHSTEMP       | -/~3.0K                               |  |                     |
|           |                                | EVAPHSTEMP       | -/~3.0K                               |  |                     |
|           |                                | SHUNTTEMP        | -/~1.7K                               |  |                     |
|           |                                | EMCFILTEMP       | -/~4.6K                               |  |                     |
|           |                                | SL0TEMP          | -/~1.7K                               |  |                     |
|           |                                | PL0TEMP          | -/~1.7K                               |  |                     |
|           |                                | OPTTEMP          | -/~4.6K                               |  |                     |
|           |                                | BAFTEMP          | -/~4.6K                               |  |                     |
|           |                                | BSMIFTEMP        | -/~4.5K                               |  |                     |
|           |                                | SCAL2TEMP        | -/~4.6K                               |  |                     |
|           |                                | SCAL4TEMP        | -/~4.6K                               |  |                     |
|           |                                | SCALTEMP         | -/~4.6K                               |  |                     |
|           |                                | SMECIFTEMP       | -/~4.6K                               |  |                     |
|           |                                | SMECTEMP         | -/~4.6K                               |  |                     |
|           |                                | BSMTEMP          | -/~4.5K                               |  |                     |
| 6         | Wait for the I-EGSE staff to   | _                |                                       |  |                     |
|           | confirm the success or failure |                  |                                       |  |                     |
|           | of this test                   |                  |                                       |  |                     |
| Test Resu | It (Pass/Fail):                |                  |                                       |  |                     |

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#### 7.2.6.30 Procedure SPIRE-IST-COLD-FUNC-SCU-06-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU AC thermometry check  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and DC thermometry is ON   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON  |
| Constraints           | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 2 minutes   |
| Pass/Fail Criteria    | SCU AC thermometry channel shows temperature readings according to the actual instrument temperature  |

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# Procedure Steps:

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SCU-06-R.tcl                                       | _                | _                                     | _   |                     |
| 2    | Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm                              | _                | _                                     | _   |                     |
| 3    | A few seconds later record the value of parameter SUBKSTAT                                | SUBKSTAT         | 0/1/1                                 |   |                     |
| 4    | If the instrument is at He I temperatures check the value of SCU AC thermometry channel.  | SUBKTEMP         | ~4K                                   |   |                     |
| 5    | If the instrument is at He II temperatures check the value of SCU AC thermometry channel. | SUBKTEMP         | ~1.7K                                 |   |                     |
| 6    | Wait for the I-EGSE staff to confirm the success or failure of this test                  | _                | _                                     | _   |                     |

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#### 7.2.6.31 Procedure SPIRE-IST-COLD-FUNC-MCU-01-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU (REDUNDANT) Boot Check  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON  |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted.   |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | MCU voltages and board temperatures show expected 'ON' values                               |

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### **Procedure Steps:**

| Step    | Description   | Parameter – Unit  | Expected Values Before/ During/ After  | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|---------|---|---|--|---|---------------------|
| 1       | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-01-R.tcl                     | _   | _  | _   |                     |
| 2       | Check that the MCU is booted up successfully                            | MCUBITSTAT  | 0/1/1  |   |                     |
| 3       | Check MCU HK parameter values and ensure that the values are refreshing | MCUP5V MCUP14V MCUM14V MCUP15V MCUM15V MCUMACTEMP MCUSMECTEMP | ~ 5.0 ± 0.2V<br>~ 14.0 ± 0.5V<br>~ -14.0 ± 0.5V<br>~ 15.0 ± 0.5V<br>~ -15.0 ± 0.5V<br>~300K<br>~300K |   |                     |
| Test Re | sult (Pass/Fail):   | MCUBSMTEMP  | ~300K  |   |                     |

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### 7.2.6.32 Procedure SPIRE-IST-COLD-FUNC-MCU-03-R

| Version                        | 2.4   |
|--------------------------------|---|
| Date                           | 6th December 2007   |
| Purpose                        | MCU Nominal Science Contents Check  |
| Initial configuration          | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                                | ON and MCU REDUNDANT is booted.   |
| Final configuration Unchanged. |   |
| Preconditions                  | SPIRE DRCU REDUNDANT is switched ON   |
|                                | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                                | CCS is up and running   |
|                                | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration                       | 5 minutes   |
| Pass/Fail criteria             | Specified MCU HK parameters show expected increment   |

### **Procedure Steps:**

| Step | Description   | Parameter - Unit | Expected Values Before/ During/ After | Actual<br>Values<br>Before/<br>During/<br>After | Success/<br>Failure |
|------|---|------------------|---------------------------------------|---|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-MCU-03-R.tcl | MCUFRAMECNT      | 0/-/297                               |   |                     |

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# 7.2.6.33 Procedure SPIRE-IST-COLD-FUNC-SMEC-01-R

| Version   | 2.4   |
|---|---|
| Date  | 6th December 2007   |
| Purpose SMEC (REDUNDANT) Encoder/LVDT Sensor Check. |   |
| Initial configuration                               | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|   | ON and MCU REDUNDANT is booted.   |
| Final configuration                                 | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|   | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.                               |
| Preconditions                                       | SPIRE DRCU REDUNDANT is switched ON   |
|   | SPIRE MCU REDUNDANT is booted.  |
|   | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|   | CCS is up and running   |
|   | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration  | 5 minutes   |
| Pass/Fail criteria                                  | HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.                           |

# **Procedure Steps:**

| Step                     | Description  | Parameter – Unit          | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------------------------|--|---------------------------|-------------------------------------|-----------------------------------|---------------------|
| 1                        | Execute TCL script SPIRE-IST-COLD-FUNC-<br>SMEC-01-R.tcl | _                         | _                                   | _                                 | Tundro              |
| 2                        | Check that power to the SMEC LED and LVDT sensor is on   | SMECENCPWR<br>SMECLVDTPWR | 0/-/1<br>0/-/1                      |                                   |                     |
| Test Result (Pass/Fail): |  |                           |                                     |                                   |                     |

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### 7.2.6.34 Procedure SPIRE-IST-COLD-FUNC-SMEC-03-R

| Version                       | 2.4   |  |
|-------------------------------|---|--|
| Date                          | th December 2007  |  |
| Purpose                       | Purpose SMEC (REDUNDANT) Encoder Integrity Check.   |  |
| Initial configuration         | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |  |
|                               | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.  |  |
| Final configuration Unchanged |   |  |
| Preconditions                 | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |  |
| Duration                      | 5 minutes   |  |
| Pass/Fail criteria            |   |  |

### **Procedure Steps:**

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values<br>Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|--------------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-03-R.tcl                     | _                | _                                   | _                                    |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                                   | _                                    |                     |

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#### 7.2.6.35 Procedure SPIRE-IST-COLD-FUNC-SMEC-02A-R

| Version   | 2.5   |
|---|---|
| Date  | 3 <sup>rd</sup> July 2008   |
| Purpose Open the SMEC Launch Latch REDUNDANT (Unlatch it) |   |
| Initial configuration                                     |   |
|   | ON and MCU REDUNDANT is booted and SMEC is latched  |
| Final configuration                                       | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|   | ON and MCU REDUNDANT is booted and SMEC is ON and Unlatched                                 |
| Preconditions   | SPIRE DRCU REDUNDANT is switched ON   |
|   | SPIRE MCU REDUNDANT is booted.  |
|   | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|   | CCS is up and running   |
|   | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
|   | The Herschel Cryostat should be tilted horizontal   |
| Duration  | 20 minutes  |
| Pass/Fail criteria  | The SMEC latch is open.   |

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| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-02A-R.tcl                                    |                  | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test                 | _                | _                                   | _                                 |                     |
|      | The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  |                                     |                                   |                     |

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# 7.2.6.36 Procedure SPIRE-IST-COLD-FUNC-SMEC-FFOFFSET-R

| Version               | 1.2   |
|-----------------------|---|
| Date                  | 10 <sup>th</sup> July 2008  |
| Purpose               | SMEC (REDUNDANT) Open Loop Feed Forward Offset Test   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry  |
| Final configuration   | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON. Unchanged  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>SMEC PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 60 minutes  |
| Pass/Fail criteria    | Optimum SMEC Feed Forward Offset is determined  |

**Procedure Steps:** 

| Step | Description  | Parameter – Unit | Expected Values       | Actual Values         | Success/ |
|------|--|------------------|-----------------------|-----------------------|----------|
| 1    | Execute TCL script SPIRE-IST-COLD-<br>FUNC-SMEC-FF0FFSET-R.tcl           | _                | Before/During/After — | Before/During/After — | Failure  |
|      | Wait for the I-EGSE staff to confirm the success or failure of this test | _                | _                     | _                     |          |

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| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 3    | Based on the results of this test it may be necessary to set the SMEC FF Offset manually. |                  |                                     |                                   |                     |
|      | -   | SMECFFOFFSET     | -/ - /xxxx                          | !                                 |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9055xxxx  • param 2 = 0                            |                  |                                     |                                   |                     |
|      | I-EGSE staff will supply the 16-bit parameter value xxxx to this command.                 |                  |                                     |                                   |                     |
| 4    | Based on the results of this test it may be necessary to set the SMEC FF Gain manually.   |                  |                                     |                                   |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9054xxxx  • param 2 = 0                            | SMECFFGAIN       | -/ - /xxxx                          |                                   |                     |
|      | I-EGSE staff will supply the 16-bit parameter value xxxx to this command.                 |                  |                                     |                                   |                     |

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| Step   | Description                                     | Parameter – Unit | Expected Values     | Actual Values       | Success/ |
|--------|---|------------------|---------------------|---------------------|----------|
|        |   |                  | Before/During/After | Before/During/After | Failure  |
| 5      | A manual reset of the encoder signals 1 and     |                  |                     |                     |          |
|        | 2 offsets may be required. If this is the case  |                  |                     |                     |          |
|        | Two MANUAL commands will be required to         |                  |                     |                     |          |
|        | be sent from the CCS:                           |                  |                     |                     |          |
|        | SPIRE_SEND_DRCU_COMMAND                         |                  |                     |                     |          |
|        | <ul> <li>param 1 = 0x9058xxxx</li> </ul>        | SMECENCSIG1OFF   | -/-/~ Commanded     |                     |          |
|        | • param 2 = 0                                   |                  | Value               |                     |          |
|        | SDIDE SEND DOOL COMMAND                         |                  |                     |                     |          |
|        | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x905Axxxx | SMECENCSIG2OFF   | -/-/~ Commanded     |                     |          |
|        | • param 2 = 0                                   |                  | Value               |                     |          |
|        | The 16 bit parameters xxxx will be provided by  |                  |                     |                     |          |
|        | I-EGSE staff                                    |                  |                     |                     |          |
| 6      | Note that it may be necessary to repeat         |                  |                     |                     |          |
|        | this test to fine tune the Feed Forward         |                  |                     |                     |          |
|        | Offset  |                  |                     |                     |          |
|        | The I-EGSE staff will need to analyse the       |                  |                     |                     |          |
|        | test data before continuing the test            |                  |                     |                     |          |
|        | sequence.                                       |                  |                     |                     |          |
| Test F | esult (Pass/Fail):                              |                  |                     |                     |          |

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# 7.2.6.37 Procedure SPIRE-IST-COLD-FUNC-SMEC-04A-R

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008  |
| Purpose               | SMEC (REDUNDANT) Open Loop Positioning Test.   |
| Initial configuration |  |
|                       | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.   |
| Final configuration   |  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 30 minutes   |
| Pass/Fail criteria    | SMEC moves to the commanded positions  |

## **Procedure Steps:**

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| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-04A-R.tcl   | _                | _                                   | _                                 |                     |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  |                                     | _                                 |                     |

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# 7.2.6.38 Procedure SPIRE-IST-COLD-FUNC-SMEC-09-R

| Version               | 2.5   |
|-----------------------|---|
| Date                  | 3 <sup>rd</sup> July 2008   |
| Purpose               | SMEC (REDUNDANT) Open Loop Scan Test.   |
| Initial configuration |   |
|                       | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.  |
| Final configuration   | Unchanged   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>SMEC PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 30 minutes  |
| Pass/Fail criteria    | SMEC performs a scan between the commanded positions  |

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#### Herschel **Test Procedure**

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## **Procedure Steps:**

| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | A manual reset of the encoder signals 1 and 2 offsets may be required. If this is the case Two MANUAL commands will be required to be sent from the CCS:          |                  |                                     |                                   |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x9058xxxx  • param 2 = 0  | SMECENCSIG1OFF   | -/-/~ Commanded<br>Value            |                                   |                     |
|      | SPIRE_SEND_DRCU_COMMAND  • param 1 = 0x905Axxxx  • param 2 = 0  | SMECENCSIG2OFF   | -/-/~ Commanded<br>Value            |                                   |                     |
|      | The 16 bit parameters xxxx will be provided by I-EGSE staff   |                  |                                     |                                   |                     |
| 2    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-09-R.tcl  | _                | _                                   | _                                 |                     |
| 3    | Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. | _                | _                                   | _                                 |                     |

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#### Procedure SPIRE-IST-COLD-FUNC-SMEC-07-R 7.2.6.39

| Version                     | 2.5  |
|-----------------------------|--|
| Date                        | 3 <sup>rd</sup> July 2008  |
| Purpose                     | SMEC (REDUNDANT) Close Loop Scan Test.   |
| Initial configuration       |  |
| 1 194145 - 24 Days Figure 1 | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.   |
| Final configuration         |  |
| Preconditions               | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration                    | 60 minutes   |
| Pass/Fail criteria          |  |

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| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Before this test a SMEC calibration table on the I-EGSE may have to be changed. Please confirm with the I-EGSE staff before continuing with the next test. | _                | _                                   | _                                 |                     |
| 2    | Execute TCL script SPIRE-IST-COLD-<br>SMEC-INIT-R.tcl  | SMECLOOPMODE     | 6/-/1                               |                                   |                     |
| 3    | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-07-R.tcl   | _                | _                                   |                                   |                     |
| 4    | Wait for the I-EGSE staff to confirm the success or failure of this test   | _                | _                                   | _                                 |                     |
|      | The I-EGSE staff will need to analyse the test data before continuing the test sequence.   |                  |                                     |                                   |                     |

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#### 7.2.6.40 Procedure SPIRE-IST-COLD-FUNC-SMEC-04B-R

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008  |
| Purpose               | SMEC (REDUNDANT) Close Loop Positioning Test.  |
| Initial configuration |  |
|                       | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON. SMEC is in closed loop.   |
| Final configuration   | Unchanged  |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration              | 20 minutes   |
| Pass/Fail criteria    | SMEC moves to the commanded positions and remains in closed loop   |

Procedure Steps:

| Step | Description   | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Execute TCL script SPIRE-IST-COLD-<br>FUNC-SMEC-04B-R.tcl   | SMECLOOPMODE     | 1/1/1                               | g, mg, men                        | ranaro              |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test The I-EGSE staff will need to analyse the test data before continuing the test sequence. | _                | _                                   |                                   |                     |

Test Result (Pass/Fail):

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## 7.2.6.41 Procedure SPIRE-IST-COLD-FUNC-SMEC-LVDT-R

| Version  | 1.1  |
|--|--|
| Date   | 10 <sup>th</sup> July 2008   |
| Purpose  | SMEC (REDUNDANT) Backup LVDT Close Loop Check  |
| Initial configuration  | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry   |
| Committee of the commit | is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON. SMEC is in closed loop.   |
| Final configuration  | Unchanged  |
| Preconditions  | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MCU REDUNDANT is booted.</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> <li>The Herschel Cryostat should be tilted horizontal</li> </ul> |
| Duration   | 90 minutes   |
| Pass/Fail criteria   | SMEC remains in closed loop on LVDT  |

**Procedure Steps:** 

| Step | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1    | Manual commanding may be necessary during this test. Details to be specified Change downlink data rate to 1.5 Mbps Send command DC27F170 | _                | —                                   | —                                 | ranure              |
| 2    | Wait for the I-EGSE staff to confirm the success or failure of this test   |                  | _                                   | _                                 |                     |

Test Result (Pass/Fail):

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# 7.2.6.42 Procedure SPIRE-IST-COLD-FUNC-SMEC-02B-R

| Version               | 2.5  |
|-----------------------|--|
| Date                  | 3 <sup>rd</sup> July 2008                                      |
| Purpose               | Close the SMEC Launch Latch (Latch it)                         |
| Initial configuration |  |
|                       | is ON and MCU REDUNDANT is booted and SMEC is ON and unlatched |
| Final configuration   |  |
|                       | is ON and MCU REDUNDANT is booted and SMEC is ON and Latched   |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON                            |
|                       | SPIRE MCU REDUNDANT is booted.                                 |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.           |
|                       | CCS is up and running  |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS      |
| Duration              | 30 minutes   |
| Pass/Fail criteria    | The SMEC latch is closed                                       |

**Procedure Steps:** 

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| Step                     | Description  | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------------------------|--|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1                        | Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-02B-R.tcl                                    | _                | _                                   | _                                 |                     |
| 2                        | Wait for the I-EGSE staff to confirm the success or failure of this test                 | _                | _                                   | _                                 |                     |
|                          | The I-EGSE staff will need to analyse the test data before continuing the test sequence. |                  |                                     |                                   |                     |
| Test Result (Pass/Fail): |  |                  |                                     |                                   |                     |

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# 7.2.6.43 Procedure SPIRE-IST-COLD-SMEC-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SMEC (REDUNDANT) Switch OFF   |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON.                               |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are OFF.                              |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is booted.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              |   |
| Pass/Fail criteria    | HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.                          |

Procedure St ps:

| Step                     | Description                                 | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------------------------|---|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1                        | Execute SPIRE-IST-COLD-SMEC-OFF-R.tcl       | _                |                                     |                                   |                     |
| 2                        | Check that the power to the SMEC sensors is | SMECENCPWR       | 1/-/0                               |                                   |                     |
|                          | switched off                                | SMECLVDTPWR      | 1/-/0                               |                                   |                     |
| Test Result (Pass/Fail): |   |                  |                                     |                                   |                     |

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#### 7.2.6.44 Procedure SPIRE-IST-COLD-MCU-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | MCU REDUNDANT Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
|                       | ON and MCU REDUNDANT is booted.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is |
| <b>一种工程的基础的</b>       | ON and MCU REDUNDANT is OFF.  |
| Preconditions         | SPIRE DRCU REDUNDANT is switched ON   |
|                       | SPIRE MCU REDUNDANT is ON.  |
|                       | SPIRE MIB REDUNDANT is imported in the CCS database.  |
|                       | CCS is up and running   |
|                       | FUNCTIONAL TEST PARAMETERS display is selected on the CCS                                   |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified MCU HK Parameter shows expected value.  |

## **Procedure Steps:**

| Step                     | Description                          | Parameter – Unit | Expected Values Before/During/After | Actual Values Before/During/After | Success/<br>Failure |
|--------------------------|--------------------------------------|------------------|-------------------------------------|-----------------------------------|---------------------|
| 1                        | Execute SPIRE-IST-COLD-MCU-OFF-R.tcl |                  | _                                   |                                   |                     |
| 2                        | Check that the MCU is switched off   | MCUBITSTAT       | 1/-/0                               |                                   |                     |
| Test Result (Pass/Fail): |                                      |                  |                                     |                                   |                     |

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#### 7.2.6.45 Procedure SPIRE-IST-COLD-SCU-OFF-R

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6th December 2007   |
| Purpose               | SCU REDUNDANT Switch OFF  |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is ON.   |
| Final configuration   | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced and AC/DC thermometry is OFF   |
| Preconditions         | <ul> <li>SPIRE DRCU REDUNDANT is switched ON</li> <li>SPIRE MIB REDUNDANT is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | 5 minutes   |
| Pass/Fail criteria    | Specified SCU HK Parameters show expected value.  |

## **Procedure Steps:**

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| <u> </u>               | <u> </u> |  |

| Description   | Parameter - Unit  | Expected Values Before/During/After  | Actual Values Before/During/After  | Success/<br>Failure  |
|---|---|--|--|--|
| Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl               | -   | _  | _  |  |
| A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT   | 0xFFFF/-/0   |  |  |
| A few seconds later record the value of parameter SUBKSTAT    | SUBKSTAT  | 1/-/0  |  |  |
|   | Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl  A few seconds later record the value of parameter SCUTEMPSTAT  A few seconds later record the value of parameter | Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl  A few seconds later record the value of parameter SCUTEMPSTAT  A few seconds later record the value of parameter SUBKSTAT | Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl  A few seconds later record the value of parameter SCUTEMPSTAT  A few seconds later record the value of parameter  SUBKSTAT  SUBKSTAT  1/-/0 | Execute TCL script SPIRE-IST-COLD-SCU-OFF-R.tcl  A few seconds later record the value of parameter SCUTEMPSTAT  A few seconds later record the value of parameter  SCUTEMPSTAT  SUBKSTAT  1/-/0  Before/During/After  COXFFFF/-/0  SUBKSTAT  1/-/0 |

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#### 7.2.6.46 Switch OFF After SPIRE REDUNDANT SMEC

| Step-<br>No. | Test-Step-Description  | Nominal Value | Actual Value | Remarks | P | N |
|--------------|--|---------------|--------------|---------|---|---|
| 8.           | From the HPCCS test conductor console start the test script to power OFF SPIRE REDUNDANT:  S102999SCVT034_ASDCFTSPIR_PWR_OFF_R                   | ок            |              |         |   |   |
| 9.           | On HPCCS when prompted:  "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct"  Select YES | YES           |              |         |   |   |
|              | If <b>YES</b> is selected the test script will go on to automatically power off all SPIRE warm units.  |               |              |         |   |   |

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| Step- | Test-Step-Description   | Nominal Value    | Actual Value | Remarks       | Р | N |
|-------|---|------------------|--------------|---------------|---|---|
| No.   | Note: During Switch OFF of SPIRE, the following (5,1) and (5,4) event messages on APID 1281 may be expected and do not indicate a problem:  g) EVID 1313 No_MCU_Response_Error h) EVID 21773 ALARM_LSMCU_DEAD  However, be aware that if FDIR is enabled for SPIRE in the CDMU then this may trigger an |                  |              |               |   |   |
|       | OBCP On HPCCS when prompted:  |                  |              | AND: SA_1_559 |   |   |
|       | "Check Telemetry No Longer Updating - OK to continue"   |                  |              | AND. 0A_1_000 |   |   |
| 10.   | Check that parameters:  |                  |              |               |   |   |
|       | THSK  | Not refreshing   |              |               |   |   |
|       | TM2N  | Not incrementing |              |               |   |   |
| 11.   | Select OK to continue   | ок               |              |               |   |   |

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| Step-<br>No | Test-Step-Description   | Nominal Value | Actual Value | Remarks | Р | N |
|-------------|---|---------------|--------------|---------|---|---|
| 12.         | On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT034_ASDCFTSPIR_PWR_OFF_R it will prompt: |               |              |         |   |   |
|             | "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"   |               |              |         |   |   |
| 13.         | Select OK to continue   | ОК            |              |         |   | + |
| 14.         | On HPCCS stop Packet History displays for the following APIDs:1281,1283   | ОК            |              |         |   |   |
|             | SPIRE REDUNDANT OFF   |               |              |         |   |   |

| Enter C  | Date/Time:        |           |      |     |
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## 7.2.7 Satellite & EGSE Switch Off After SMEC Tests

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value          | Tolerance | Actual<br>Value |              | Р | N        |
|--------------|---|---------------------------|-----------|-----------------|--------------|---|----------|
|              | Satellite & EGSE Switch Off   |                           |           |                 |              |   |          |
|              | Initial Conditions: Nominal & Redundant SPIRE warm units OFF  |                           |           |                 |              |   |          |
| 1            | On HPCSS terminate ALL_SubscribeParams.tcl test script.   | ок                        |           |                 |              |   |          |
| 2            | From HPCCS Test Conductor console issue command to disconnect from SPIRE I-EGSE                     |                           |           |                 |              |   |          |
|              | disconnect HSPIREEGSE   |                           |           |                 |              | _ | $\vdash$ |
| 3            | Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful                           | YZS29940=<br>DISCONNECTED |           |                 | AND SYS_PARS |   |          |
| 4            | Switch OFF I-EGSE i.a.w. AD 5   | ок                        |           |                 |              |   |          |
| 5            | Stop monitoring CryoSCOE data on the CCS by selecting Stop Record & Exit from the following script: |                           |           |                 |              |   |          |
|              | K102999ECVT035_ASDGEN_SCOE_CCU_LOG  | ок                        |           |                 |              |   |          |
| 6            | From HPCCS disable Monitoring Mode 1 (512sec cycle) for CCU A & B by executing test script:         |                           |           |                 |              |   |          |
|              | K102999ECVT001_ASDGENCCU_MnDBOTH1   | ок                        |           |                 |              |   |          |
| 7            | From HPCCS power OFF CCU A & CCU B by executing test script:  |                           |           |                 |              |   |          |
|              | K102999ECVT001_ASDGENCCU_ABPWROFF   | ок                        |           |                 |              |   |          |
| 8            | Switch OFF Satellite/SVM, HPCCS and SCOEs i.a.w. procedure  | ок                        |           |                 |              |   |          |

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| Step-<br>No. | Test-Step-Description                        | Nominal<br>Value | Tolerance | Actual<br>Value |        | Р | N |
|--------------|--|------------------|-----------|-----------------|--------|---|---|
|              | AD 2 Sections 7.7 to 7.11.                   |                  |           |                 |        |   |   |
| 9            | Confirm both Satellite and EGSE powered down | ОК               |           |                 | 104200 |   |   |
|              | End Conditions: Satellite and EGSE OFF       |                  |           |                 |        |   |   |
|              | END OF SMEC TESTS                            |                  |           |                 |        |   |   |

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#### 7.2.8 SPIRE SAFE Switch Off

The following procedure describes the necessary steps to safely switch off SPIRE when directed by RAL personnel if an anomaly should occur.

| Version               | 2.4   |
|-----------------------|---|
| Date                  | 6 <sup>th</sup> December 2007   |
| Purpose               | To switch OFF the SPIRE instrument if an anomaly should occur   |
| Initial configuration | SPIRE can be in ANY configuration as specified in the test sequence in section 4.1  |
| Final configuration   | SPIRE is OFF  |
| Preconditions         | <ul> <li>SPIRE FM DPU is electrically integrated with the Herschel Satellite</li> <li>SPIRE MIB is imported in the CCS database.</li> <li>CCS is up and running</li> <li>FUNCTIONAL TEST PARAMETERS display is selected on the CCS</li> </ul> |
| Duration              | ~5-8 minutes  |
| Pass/Fail Criteria    | SPIRE is OFF.   |
|                       | All instrument subsystems are completely powered OFF.   |

#### Notes:

- 1. All HK parameters relevant to this procedure can be located on the FUNCTIONAL TEST PARAMETERS CCS display
- 2. The expected values of HK parameters before the execution of a switch-off script are not indicated in the table below because the scripts can be run from any instrument configuration without harming the instrument.

| Enter Date/Time:           | Sign Off: |          |
|----------------------------|-----------|----------|
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Herschel

Enter Start Date|Time:

| Step | Description   | Parameter - Unit   | Expected value before/after | Actual value before/after |
|------|---|--|-----------------------------|---------------------------|
| 1.   | Execute Procedures: SPIRE-IST-COLD-PDET-OFF-P/R         | PLIABITSAT   | - / 0                       | Delote/aiter              |
|      |   | PSWJFETSTAT  | -/0                         |                           |
|      | <ul><li>SPIRE-IST-COLD-BSM-OFF-P/R</li></ul>            | PMLWJFETSTAT   | -/0                         |                           |
|      |   | CHOPSENSPWR  | -/0                         |                           |
|      |   | JIGGSENSPWR  | -/0                         |                           |
| 2.   | Execute Procedures: SPIRE-IST-COLD-SDET-OFF-P/R         | SLIABITSAT   | -/0                         |                           |
|      | <ul> <li>SPIRE-IST-COLD-SMEC-OFF-P/R</li> </ul>         | SPECJFETSTAT   | -/0                         |                           |
|      |   | SMECENCPWR   | -/0                         |                           |
|      |   | SMECLVDTPWR  | -/0                         |                           |
| 3.   | Execute Procedures: SPIRE-IST-COLD-MCU-OFF-P/R          | MCUBITSTAT   | -/0                         |                           |
|      | <ul> <li>SPIRE-IST-COLD-SCU-OFF-P/R</li> </ul>          |  |                             |                           |
|      |   | SCUTEMPSTAT<br>SUBKSTAT  | -/0<br>-/0                  |                           |
| 4.   | Power off according to procedure 7.2.2.32 for PRIME and | SSENCTIAL STATE OF THE SENCE OF | -70                         |                           |
|      | 7.2.3.32 for REDUNDANT                                  |  |                             |                           |

| Enter Date/Time:           |           |
|----------------------------|-----------|
| Ciller Dale/Time:          | Sign Off: |
|                            | Sign Off: |
| Doc. No: HP-2-ΔSED-TP-0217 |           |

Issue:

2.0

Date:

17.02.09



Herschel

### 7.2.9 SPIRE SAFE Switch Off for Standalone SMEC Test Sequence

The following procedure describes the necessary steps to safely switch off SPIRE when directed by RAL personnel if an anomaly should occur.

| Version               | 1.0  |  |
|-----------------------|--|--|
| Date                  | 6 <sup>th</sup> December 2007  |  |
| Purpose               | To switch OFF the SPIRE instrument if an anomaly should occur  |  |
| Initial configuration | SPIRE can be in ANY configuration as specified in the test sequence in section 7.2.6   |  |
| Final configuration   | SPIRE is OFF   |  |
| Preconditions         | SPIRE FM DPU is electrically integrated with the Herschel Satellite SPIRE MIB is imported in the CCS database. CCS is up and running FUNCTIONAL TEST PARAMETERS display is selected on the CCS |  |
| Duration              | ~5-10 minutes  |  |
| Pass/Fail Criteria    | SPIRE is OFF. All instrument subsystems are completely powered OFF.  |  |

#### Notes:

- 3. All HK parameters relevant to this procedure can be located on the FUNCTIONAL TEST PARAMETERS CCS display
- 4. The expected values of HK parameters before the execution of a switch-off script are not indicated in the table below because the scripts can be run from any instrument configuration without harming the instrument.

| Enter Date/Time: | Sign Off: |  |
|------------------|-----------|--|
|                  |           |  |

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age **226** 



# Herschel

Enter Start Date|Time:

|    | Description  | Parameter - Unit           | Expected value before/after | Actual value before/after |
|----|--|----------------------------|-----------------------------|---------------------------|
| 1. | Execute Procedures: SPIRE-IST-COLD-SMEC-02B-P/R                                | -                          | -                           |                           |
|    | ■ SPIRE-IST-COLD-BSM-OFF-P/R   | CHOPSENSPWR<br>JIGGSENSPWR | - / 0<br>- / 0              |                           |
| 2. | Execute Procedures:  |                            |                             |                           |
|    | ■ SPIRE-IST-COLD-SMEC-OFF-P/R  | SMECENCPWR<br>SMECLVDTPWR  | -/0<br>-/0                  |                           |
| 3. | Execute Procedures: SPIRE-IST-COLD-MCU-OFF-P/R                                 | MCUBITSTAT                 | -/0                         |                           |
| 4  | Power off according to procedure 7.2.6.26 for PRIME and 7.2.6.46 for REDUNDANT |                            |                             |                           |

| Enter D  | Date/Time:        | Sign Off: |     |
|----------|-------------------|-----------|-----|
| Doc. No: | HP-2-ASED-TP-0217 |           | 227 |
| Issue:   | 2 በ               | Page Page | 227 |

Issue: 2.0 Date: 17.02.09







#### **Summary Sheets** 8

Doc. No: HP-2-ASED-TP-0217

Issue: Date:

2.0 17.02.09



#### 8.1 **Procedure Variation Summary**

|   | ٦   | est Change  | Curr. No.:  |                      |
|---|---|---|---|----------------------|
|   |   |   | Date  |                      |
|   |   |   | Page  | of                   |
| Test designation  |   | Test Procedure  | Issue   | Rev.                 |
| Test step changed   |   | Reason for Change   |   |                      |
| #2: SPIRE<br>#3: Funct<br>#4: Swit<br>#5: Differ<br>#6: NOS<br>#7 SPR | eft Power<br>Spectional Pour<br>ch to B<br>ent Pour<br>smm, n<br>sot. Appli | redon ofter: oneter swit oneter swit ont of LL-c us B and ba of onloff K so MTL, No cable to t poet-P sw ps to reduce | ch on to hade.  Leto Builder  OSCR uplants proce  It of off | s A<br>s ord<br>dure |
| Prepared by:  | Resp. Te  | est Leader  | Project Engineer  |                      |
| PA/QA   | Prime   |   | Customer  |                      |

Table 8.1-1: Procedure Variation Sheet

File: HP-2-ASED-TP-0217\_2.doc

Doc. No: HP-2-ASED-TP-0217

Issue:

Date:

2.0 17.02.09

|                                 | Test Change       | Curr. No.: 1<br>Date: 26/02/2009             |
|---------------------------------|-------------------|--|
| Toot donimantia                 |                   | Page: 1 of 1                                 |
| Test designation                | Test Procedure    | Issue Rev.                                   |
| SPIRE CFT Test step changed     | TP-0217           |  |
| rest step changed               | Reason for Change |  |
| The SVM should NOT be swi       | tched OFF         | ON for further testing                       |
|                                 | TO B              | V Discussed at La                            |
| Other tests will take over from | this point.       | in HIT of still                              |
|                                 | Cau               | e Discussed at Ro<br>wh AIT of still<br>red) |
|                                 | - /               |  |
|                                 |                   |  |
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|                                 |                   |  |
|                                 |                   |  |
| pared by:                       | Resp. Test Leader | Project Engineer                             |
|                                 | rime Toyour       | Customer                                     |
| Coossens 4.                     |                   |  |
| //                              | -                 |  |

|                    | Test Change                   | Curr. No.: 2      |   |
|--------------------|-------------------------------|-------------------|---|
|                    |                               | Date: 26/02/2009  |   |
|                    |                               | Page: 1 of        |   |
| Test designation   | Test Procedure                | Issue Rev.        | *************************************** |
| SPIRE CFT at He1   | TP-021 <b>37</b>              | 2                 |   |
| Test step changed  | Reason for Change             |                   |   |
| After 7.2.2.29     | SPIRE Spectromet              | er switch ON test |   |
| Run HP-2-ASED-SD-0 | 470                           |                   |   |
| 2                  | 470  Attical  Boz (or obline) |                   |   |
|                    |                               |                   |   |
| repared by:        | Resp. Test Leader             | Project Engineer  |   |
| NOA R. Goos sens   | Prime                         | Customer          |   |
|                    |                               |                   |   |

|                    |              | Test Change           | Curr. No.: 3     |       |
|--------------------|--------------|-----------------------|------------------|-------|
|                    |              | •                     | Date: 26/02/2    | 2009  |
|                    |              |                       | Page: 1          | of    |
| Test designation   |              | Test Procedure        | Issue            | Rev.  |
| SPIRE CFT at He1   |              | TP-02197              | 2                | 1.64. |
| est step changed   |              | Reason for Change     |                  |       |
| Prior to 7.2.2     |              | Functional part of LL | check            |       |
| Run HP-2-ASED-SD-0 | 469 steps 23 |                       | <u> </u>         |       |
| Con plete          | ed on        | 84/02/09 C            | 00:49            |       |
|                    |              |                       |                  |       |
| pared by:          | Resp. Te     | st Leader Lope        | Project Engineer |       |

|                                    | Test Change                       | Curr. No.: 4       |       |             |            |
|------------------------------------|-----------------------------------|--------------------|-------|-------------|------------|
|                                    |                                   | Date: 26/02/       | 2009  |             |            |
|                                    |                                   | Page: 1            | of    |             |            |
| Test designation                   | Test Procedure                    | Issue              | Rev.  |             |            |
| SPIRE CFT at He1                   | TP-02197                          | 2                  |       |             |            |
| Test step changed                  | Reason for Change                 |                    |       |             |            |
| After 7.2.2.30 / after 7.          |                                   | + back to bus A    |       |             |            |
| Perform a test of 2 mir            |                                   | 27/09              | ,     | son         | Stie       |
| • Callasync D102                   | 2159SCVT174_IST_REDUNDA           | NT_CONF B 0 0 0 0  | 00    | DE.         | OK         |
|                                    | SPIRE telemetry is still receive  | d                  | C     | ok.         | عاد        |
| Send SPIRE Te                      | est TC: SCL00500                  |                    | C     | K, C        | کاد        |
| Check correct T                    | C acknowledgements                |                    | 0     | ~ C. O      | K.         |
| <ul> <li>Callasync D102</li> </ul> | 2159SCVT174_IST_REDUNDA           | ANT_CONF A 0 0 0 0 | 00 0  | الد و       | o K        |
| Check whether !                    | SPIRE telemetry is still received | d                  | O     | اد ه        | યે<        |
| Send SPIRE Tes                     | st TC: SCL00500                   |                    | e     | ok o        | אל         |
| Check correct To                   | C acknowledgements                |                    | c     | ok c        | ) <u>1</u> |
|                                    | 27lor<br>06:15                    | 109, 2             | Horts |             |            |
|                                    | Non, Com                          | 2.10               | 08:3  |             |            |
|                                    |                                   | frace k            | ed la | w brog      | <b>L</b>   |
|                                    |                                   |                    | S.    | <b>&gt;</b> |            |
|                                    |                                   | Detalos            | 2. /= | D. to       | hod        |
|                                    |                                   | ι                  | `     |             |            |
|                                    |                                   |                    |       |             |            |
|                                    |                                   |                    |       |             |            |
|                                    |                                   |                    |       |             |            |
|                                    |                                   |                    |       |             |            |
|                                    | ·                                 |                    |       |             |            |
| pared by:                          |                                   |                    |       |             |            |
| Ilsen                              | Resp. Test Leader                 | Project Engineer   |       |             |            |
| R Goossans                         | Prime Prime                       | Customer           |       |             |            |
|                                    |                                   |                    |       |             |            |

|                      | Test Change                 | Curr. No.: 5     |       |   |
|----------------------|-----------------------------|------------------|-------|---|
|                      |                             | Date: 26/02      | /2009 |   |
|                      |                             | Page: 1          | of    |   |
| Test designation     | Test Procedure              | Issue            | Rev.  |   |
| SPIRE CFT at He1     | TP-02197                    | 2                | -     |   |
| Test step changed    | Reason for Change           |                  |       |   |
| Chapter 7.2.1 4b +   | Different power ON          | I/OFF – ACS-SD4  | 171   |   |
| Chapter 7.2.4 6b     |                             |                  |       |   |
| Power ON/OFF the S/C | using HP-2-ASED-SD-0471 bec | ause of NCR 491  | 3     |   |
|                      |                             |                  |       |   |
|                      |                             |                  |       |   |
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|                      |                             |                  |       |   |
| pared by:            | Resp. Test Leader  A. Clope | Project Engineer |       |   |
| R. Coossens          | Prime Prime                 | Customer         |       |   |

|                                    | Test Change                     | Curr. No.:       | <b>1</b> 71                             |  |
|------------------------------------|---------------------------------|------------------|---|--|
|                                    |                                 | Date 26          |   |  |
|                                    |                                 | Page /           | of /                                    |  |
| Test designation                   | Test Procedure                  |                  | Rev.                                    |  |
| SPIRE                              | CFT/SFT Test Procedure          | 0971             | _                                       |  |
| Test step changed 6 17             | Reason for Chang                |                  | Switch on pace                          |  |
| /                                  | 7,50,7                          | an co speciel    | 300000000000000000000000000000000000000 |  |
| //                                 | at step 6 ch                    | nange the e      | error                                   |  |
|                                    | message to ux                   | ait for in:      |   |  |
|                                    | " YM 6649                       | 152 'LPS_645     | _v_n_DAQ'                               |  |
|                                    |                                 | validated"       |   |  |
|                                    | then perform                    | n stepy.         |   |  |
|                                    |                                 | , ,              |   |  |
|                                    |                                 |                  |   |  |
| 2/ 2                               | Due to a safe<br>the switch-    | ety loop trig    | ggering                                 |  |
|                                    | the switch-                     | on is change     | ed to:                                  |  |
| - 2                                | Leave BDR 1 0                   | N and BOR        | 2 OFF,                                  |  |
| - acknowledge safety loop on BSIM  |                                 |                  |   |  |
| - SWITCH BSIM ONLINE               |                                 |                  |   |  |
| _ ,                                | if oh then s                    | switch BDR2      | BN                                      |  |
|                                    |                                 |                  |   |  |
|                                    |                                 |                  |   |  |
|                                    |                                 |                  |   |  |
| Prepared by Oxyssev                | Resp. Test Leader Po Y. Riche & | Project Engineer |   |  |
| <u>K. boossen</u><br>PAOR. boossen | Prime                           | Customer         |   |  |
|                                    |                                 |                  |   |  |

|                  | Test Change               | Curr. No.:          |
|------------------|---------------------------|---------------------|
|                  |                           | Date & 7/08/09      |
|                  |                           | Page 1 of 1         |
| est designation  | Test Procedure            | Issue Rev.          |
| SPIRE CFT mon    | TP-0812                   | 2 -                 |
| est step changed | Reason for Change         |                     |
| 46               | DO SSMM now MTL non OBX P |                     |
| Mip chapter 7    | s.3 (SSMM on,             | MILON + OBOP loady) |
| epared by:       | Resp. Test Leader         | Project Engineer    |
| Coos seus        | Frime                     | Customer            |

| Test Change  Curr. No.: #8- Date 27/02/09 Page   of / Page   of / SPILE CFT CSCT. Test Procedure  Test step changed  Test step changed  Test step changed  Test step changed  Test SPILET - POET - P Switch Off  Repeat step 1 of the SPILET - SCCT Step 1  Completed 27/02/09 04:48. |              |                     | 11 2                |
|---|--------------|---------------------|---------------------|
| Page of  Test designation  Test Procedure  SPICE CFT CSC TP-0217  Test step changed  Reason for Change  SPRIBT-POST-P Switch OFF  Repeat step 1 of 1  Repeat step 1 of 2  Reason for Change  SPRIBT-POST-P Switch OFF  Repeat step 1 of 6  Autorbaisa change                          |              | Test Change         |                     |
| Test designation  SPICE CFT CSG, TP-0217  Test step changed  Reason for Change  SPRIBT-POST-P Switch OFF  Repeat step 1 ofter SPICE IGGSE  deuter Saiga change  |              |                     | Date 27(のつ          |
| SPIRE CFT CSG. TP-0217 2  Test step changed  Reason for Change  SPR1187-PDGT-P Switch OFF  Repeat step 1 ofter SPIRE IGGSE  deuter Saige change   |              |                     | Page ( of (         |
| Test step changed  7.2.2.24 Step 1 SPR1187-PDGT_P Switch OFF  Repeat step 1 ofter SP.26 IGGSt  deuter Saisa change  |              | Test Procedure      | Issue Rev.          |
| 7.2.2.24 Step 1 SPR1187-PDET_P Switch OFF Repeat step 1 ofter SPIRE IGGSE deuter Saisa change   | Still CFT    | CSG. TP-021         | F 2 -               |
| Repeat step 1 ofter SPICE IGGSt<br>deutersaise change   | 1            |                     | \ 1                 |
| derta saisa change  | 7-2-2-24 8   | 6 T 265187.         | - PDET_P Switch OFF |
| derta saisa change  | Part         | <del>-</del> 1 0, - |                     |
| derta saisa change  | repeat       | step 1 ofter        | rice least          |
|   | dertas       | asa change          |                     |
| Compared 27/02/09 04:48.  |              | 9                   |                     |
| Compared Erroros 04:48.   |              | 6 14 0 23           | المعالية مامالية    |
|   |              | completed L         | 4,05002, 04,48,     |
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| Prepared by: Resp. Test Leader Project Engineer   | Prepared by: | Resp. Test Leader   | Project Engineer    |
|   | 200          |                     |                     |
| PA/QA Customer  | PA/QA 1 1 1  | Prime               | Customer            |
| probability (190)   | phonol:      | (19)                |                     |

|                             |         | Test Change       | Curr. No.:+<br>Date 23-10 |         |
|-----------------------------|---------|-------------------|---------------------------|---------|
|                             |         |                   | Page (                    | ` 4     |
| Test designation  SPIRE CFT |         | Test Procedure    | Issue                     | Rev.    |
| Test step changed           | W       | Reason for Change | os to reduce to           | st time |
| Skip see                    |         | 7.2.3.2           | 1,7.2.3.                  | 222     |
| Skip see                    |         | 7.2.3.2           | \$,7 ≈2·3·                | 27,     |
| T · Z · S · ·               |         |                   |                           |         |
|                             | 271     | szlog o           | 6,26                      |         |
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|                             |         |                   | , ( (                     |         |
| Prepared by:                | Resp.   | Test Leader       | Project Engineer          |         |
| PAVQA Dalsel                | . Prime |                   | Customer                  |         |



#### Non Conformance Report (NCR) Summary 8.2

| NER - No.<br>SPR | NŒR - Title<br>S€ R.                        | Date    | Open<br>Closed | PA<br>sig. |
|------------------|---|---------|----------------|------------|
| 1187             | SPIRE-IST-COLD-POST-<br>OFF-P TC Mismat cl, | 2Horlon | OPEN           | ,          |
|                  |   |         |                |            |
|                  |   |         |                |            |
|                  |   | ·       |                |            |
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|                  |   |         |                |            |

Table 8.2-1: Non-Conformance Record Sheet

Doc. No: HP-2-ASED-TP-0217

Issue: 2.0 Date:

17.02.09



Herschel



# 8.3 Sign-off Sheet

|                    | Date      | Signature   |
|--------------------|-----------|-------------|
| Test Director      | 2712109   | THUS        |
| Operator           | 27/02/09  | She         |
| PA Responsible     | 27/2/2009 | K Datahol.  |
| ESA Representative | 29/2/2009 | Le Detalial |

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Doc. No: HP-2-ASED-TP-0217

 Issue:
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 Date:
 17.02.09

 File: HP-2-ASED-TP-0217\_2.doc





# Herschel

# **APPENDIX 1** Actual SCOE cable connection (to be confirmed by AIT)

|         | SCOE                          | CABLES CONNECT  | ION to HERSCHE | L S/C           |                  |
|---------|-------------------------------|-----------------|----------------|-----------------|------------------|
| SKIN-01 | PWR Panel (PCDU)              |                 |                |                 |                  |
|         | Connector Function            | Skin Connector  | S/C unit       | SCOE CABLE      | Flight Connector |
|         |                               |                 |                | BS SCOE Cable   | /                |
|         | BS Nom Power                  | SK01BJ09        | PCDU           | Plugged         |                  |
|         |                               |                 |                | BS SCOE Cable   | /                |
|         | BS Red Power                  | SK01BJ10        | PCDU           | Plugged         |                  |
|         |                               |                 |                | LPS SCOE        | /                |
|         | BDR1 AIT                      | SK01BJ11        | PCDU           | Cable Plugged   | ,                |
|         |                               | ~               |                | LPS SCOE        | <i>V</i>         |
|         | BDR2 AIT                      | SK01BJ12        | PCDU           | Cable Plugged   |                  |
|         |                               |                 |                | POWER SCOE      |                  |
|         | SA Nom Power                  | SK01AJ01        | PCDU           | Cable Plugged   |                  |
|         |                               |                 |                | POWER SCOE      |                  |
|         | SA Nom Power                  | SK01AJ02        | PCDU           | Cable Plugged   |                  |
|         |                               |                 |                | POWER SCOE      |                  |
|         | SA Nom Power                  | SK01AJ03        | PCDU           | Cable Plugged   |                  |
|         | SA Nom Power                  | SK01AJ04        | Battery        | EMC Dust Cap    | /                |
|         |                               |                 |                | POWER SCOE      | $\vee$           |
|         | SA Red Power                  | SK01AJ05        | PCDU           | Cable Plugged   |                  |
|         |                               |                 |                | POWER SCOE      | V                |
|         | SA Red Power                  | SK01AJ06        | PCDU           | Cable Plugged   |                  |
|         | >                             |                 |                | POWER SCOE      | <b>/</b>         |
|         | SA Red Power                  | SK01AJ07        | PCDU           | Cable Plugged   |                  |
| KIN-02  | PWR Panel (ACC, CDMU, RCS, 15 | 553 & Thruster) |                |                 |                  |
|         | Connector Function            | Skin Connector  | S/C unit       | SCOE CABLE      | Flight Connector |
|         |                               |                 |                | Bus Monitor     | /                |
| SKIN-02 | DMS 1553 Bus_A                | J01             | CDMU           | Cable Plugged \ |                  |
|         |                               |                 |                | Bus Monitor     | /                |
| SKIN-02 | DMS 1553 Bus_B                | J02             | CDMU           | Cable Plugged   | 1                |
|         |                               |                 |                | ACMS SCOE       | /                |
| SKIN-02 | ACMS 1553 Bus_A               | J03             | ACC            | Cable Plugged   | 1                |
|         |                               |                 |                | ACMS SCOE       | /                |
| SKIN-02 | ACMS 1553 Bus_B               | J04             | ACC            | Cable Plugged   | <b></b>          |
| J 02    |                               |                 |                | ACMS SCOE       | /                |
| SKIN-02 | LV1/FCV 20N CMD S/A M         | J05             | ACC/RCS        | Cable Plugged   | ľ                |

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Issue: 2.0 Date:

17.02.09

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| SKIN-04            | RWL2 Sgn                                | J02             | ACC/RWL-2   |                                       | ACMS Flight Plug<br>SK04P02 Plugged |
|--------------------|---|-----------------|-------------|---------------------------------------|-------------------------------------|
|                    | RWL1 Sgn                                | J01             | ACC/RWL-1   |                                       | SK04P01 Plugged                     |
| SKIN-04            | Connector Function                      | Skill Connector | S/C unit    | SCUE CABLE                            | Flight Connector  ACMS Flight Plug  |
| 3NIN-04            | ACMS Panel (RWE)                        | Skin Connector  | C/C unit    | SCOE CABLE                            | Elight Connector                    |
| SKIN-04            | RF link for antenna MGA                 | N/A             | MGA         | MGA Plugged                           | MOA AHOUNDIC CORP                   |
|                    | 4                                       |                 |             | RF SCOE                               | MGA Anechoic Cap                    |
|                    | RF link for antenna LGA2                | N/A             | LGA2        | RF SCOE<br>LGA2 Plugged               | LGA2 Anechoic<br>Cap                |
|                    | RF link for antenna LGA1                | N/A             | LGA1        | LGA1 Plugged                          | Cap                                 |
|                    |   | Camp Commodical |             | RF SCOE                               | LGA1 Anechoic                       |
|                    | Connector Function                      | Skin Connector  | S/C unit    | SCOE CABLE                            | Flight Connector                    |
|                    | RF LINK                                 | ONUJUZ          | // NDZ/LFUZ | · · · · · · · · · · · · · · · · · · · | 9 9                                 |
| SKIN-03            | Test point TC + protection jumper EPC2  | SK03J02         | XPND2/EPC2  | U                                     | Plastic cap                         |
| SKIN-03            | Test point TC + protection jumper EPC1  | SK03J01         | XPND1/EPC1  | , /                                   | Plastic cap                         |
| Ortin-03           | Connector Function                      | Skin Connector  | S/C unit    | SCOE CABLE                            | Flight Connector                    |
| SKIN-02<br>SKIN-03 | Gyro B On/Off Cmd TTC Panel             | J17             | ACC/GYRO-E2 |                                       | SK02P17 Plugged                     |
|                    |   |                 |             |                                       | ACMS Flight Plug \                  |
| SKIN-02            | Gyro A On/Off Cmd                       | J16             | ACC/GYRO-E1 |                                       | ACMS Flight Plug<br>SK02P16 Plugged |
| SKIN-02            | Str1/2 On/Off Cmd R/Str2 Sts            | J15             | ACC/STR-2   |                                       | ACMS Flight Plug<br>SK02P15 Plugged |
| SKIN-02            | Str1/2 On/Off Cmd M/Str1 Sts            | J14             | ACC/STR-1   |                                       | ACMS Flight Plug<br>SK02P14 Plugged |
| SKIN-02            | Thruster C/B Heaters R                  | J13             | ACC/CBH     | ACMS SCOE Cable Plugged               | /                                   |
| SKIN-02            | Thruster C/B Heaters M                  | J12             | ACC/CBH     | ACMS SCOE Cable Plugged               | /                                   |
| SKIN-02            | Thruster Temp R/LV2 Sts                 | J11             | ACC/RCS     | ACMS SCOE<br>Cable Plugged            | /                                   |
| SKIN-02            | CDMU and ACC EEPROM reprogramming input | J10             | ACC/CDMU    |                                       | Flight Plug<br>SK02P10 Plugged      |
| SKIN-02            | reprogramming input                     | J09             | ACC/CDMU    | <u> </u>                              | SK02P09 Plugged                     |
|                    | CDMU and ACC EEPROM                     |                 |             |                                       | Flight Plug                         |
| SKIN-02            | Thruster Temp M/LV1 Sts                 | J08             | ACC/RCS     | ACMS SCOE Cable Plugged               |                                     |
| SKIN-02            | RCS Press/Tank Temp/PT Pwr              | J07             | ACC/PT&TH   | ACMS SCOE<br>Cable Plugged            | /                                   |
| SKIN-02            | LV2/FCV 20N CMD S/A R                   | J06             | ACC/RCS     | ACMS SCOE Cable Plugged               | /                                   |

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| SKIN-04 | 1                  | 1              |           |               | ACMS Flight Plug   |
|---------|--------------------|----------------|-----------|---------------|--------------------|
|         | RWL3 Sgn           | J03            | ACC/RWL-3 |               | SK04P03 Plugged    |
| SKIN-04 |                    |                |           |               | ACMS Flight Plug   |
|         | RWL4 Sgn           | J04            | ACC/RWL-4 |               | SK04P04 Plugged    |
| SKIN-05 | GYR/QRS Panel      |                |           |               |                    |
|         | Connector Function | Skin Connector | S/C unit  | SCOE CABLE    | Flight Connector   |
| SKIN-05 | CRS1 AOCS Sgn      | J01            | CRS-1/ACC |               | ACMS Flight Plug \ |
| SKIN-05 | CRS2 AOCS Sgn      | J02            | CRS-2/ACC |               | ACMS Flight Plug   |
| SKIN-05 |                    |                |           | ACMS SCOE     | /                  |
|         | GYRO RS422 / Test  | J03            | GYRO      | Cable Plugged | /                  |
| SKIN-05 |                    |                |           | ACMS SCOE     |                    |
| 4       | CRS 1/2 Stimuli    | J04            | CRS-1,2   | Cable Plugged |                    |
| SKIN-05 |                    |                |           | ACMS SCOE     | /                  |
|         | AAD Sgn M          | J05            | AAD/ACC   | Cable Plugged | /                  |
| SKIN-05 |                    |                |           | ACMS SCOE     |                    |
|         | SAS1/2 Sgn M       | J06            | SAS/ACC   | Cable Plugged |                    |
| SKIN-05 |                    |                |           | ACMS SCOE     | /                  |
|         | SAS1/2 Sgn R       | J07            | SAS/ACC   | Cable Plugged | ,                  |
| SKIN-05 |                    |                |           | ACMS SCOE     |                    |
|         | AAD Sgn R          | J08            | AAD/ACC   | Cable Plugged |                    |
| SKIN-06 | STR Panel          |                |           |               |                    |
|         | Connector Function | Skin Connector | S/C unit  | SCOE CABLE    | Flight Connector   |
|         |                    |                |           | ACMS SCOE \   | /                  |
| SKIN-06 | STR1 Stimuli       | J01            | STR1      | Cable Plugged | /                  |
| = 1     |                    |                |           | ACMS SCOE (   |                    |
| SKIN-06 | STR2 Stimuli       | J02            | STR2      | Cable Plugged |                    |
|         | UMBILICAL          |                |           |               |                    |
| 4. 5    | Connector Function | Connector      | S/C unit  | SCOE CABLE    |                    |
| 7, 1    |                    |                |           | SCOEs cable   | /                  |
|         | Power/Data         | HU1J01         | SYSTEM    | Plugged       | ,                  |
|         |                    |                |           | SCOEs cable { |                    |
|         | Power/Data         | HU2J01         | SYSTEM    | Plugged       |                    |

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# **APPENDIX 2**

# Accelerometer Measurement & ACMS Reaction Wheel Profile for Microphonics Test

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During reaction wheel activation the accelerometers on OBA and reaction wheel panel according to the Table A4-1 below shall be read. NB: The measurement precision is given by the type of accelerometers used for the test, which is in the order of a few milli-g.

| ZONE          | CHANNELS ID | DESCRIPTION                |  |  |
|---------------|-------------|----------------------------|--|--|
|               | PACRYO201X  | OBA                        |  |  |
|               | PACRYO202Y  | OBA                        |  |  |
| OPTICAL BENCH | PACRYO203Z  | OBA                        |  |  |
|               | PACRYO204X  | OBA                        |  |  |
|               | PACRYO205Z  | OBA                        |  |  |
|               | PACRYO206Y  | OBA                        |  |  |
|               | 381X        | RWL#4 to bracket I/F       |  |  |
|               | 381Y        | RWL#4 to bracket I/F       |  |  |
|               | 381Z        | RWL#4 to bracket I/F       |  |  |
|               | 382X        | RWL#4/RWL#2 to bracket I/F |  |  |
|               | 382Y        | RWL#4/RWL#2 to bracket I/F |  |  |
|               | 382Z        | RWL#4/RWL#2 to bracket I/F |  |  |
|               | 386X        | RWL#3 to bracket I/F       |  |  |
| -Y + Z PANEL  | 386Y        | RWL#3 to bracket VF        |  |  |
|               | 386Z        | RWL#3 to bracket VF        |  |  |
|               | 384X        | RWL#1 to bracket I/F       |  |  |
|               | 384Y        | RWL#1 to bracket VF        |  |  |
|               | 384Z        | RWL#1 to bracket VF        |  |  |
|               | 383X        | RWL#2 to bracket VF        |  |  |
|               | 383Y        | RWL#2 to bracket VF        |  |  |
|               | 383Z        | RWL#2 to bracket VF        |  |  |

Table A4--1: Measurement Channels for Micro-vibration Test (RD8)

It should be noted that the test configuration, as required in chapter 4.1 of RD8, can not be achieved and the test has to be performed under the conditions of this procedure.

| Hmax     | 25    | N.m.s |
|----------|-------|-------|
| Tmax     | 0,05  | N.m   |
| Friction | 0,005 | N.m   |
| DT       | 10    | Min   |

| time (min) | H (N.m.s) |
|------------|-----------|
| -10        | 0         |
| 0          | 0         |
| 9,25925926 | 25        |
| 10         | 25        |
| 28,5185185 | -25       |
| 30         | -25       |
| 39,2592593 | 0         |
| 50         | 0         |

**Table A4-2: Reaction Wheel Profile** 

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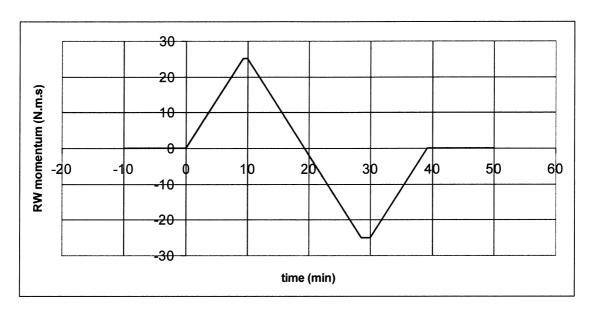


Figure A4-1: Reaction Wheel Profile Graphically

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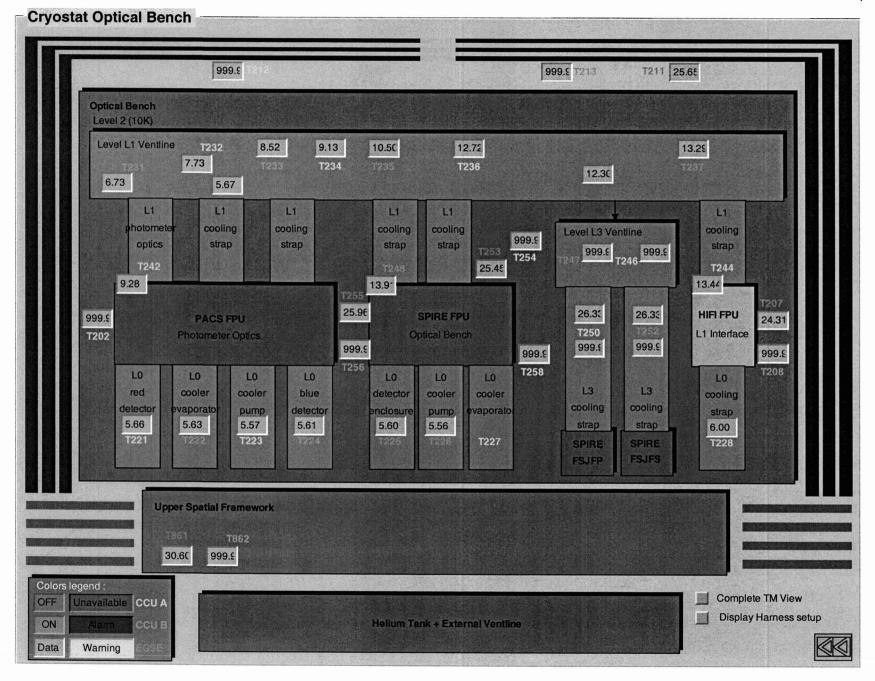
|                                       | Name                    | Dep./Comp. |          | Name                                  | Dep./Comp. |
|---------------------------------------|-------------------------|------------|----------|---------------------------------------|------------|
|                                       | Alberti von Mathias Dr. | ASG22      | 1        | Schweickert Gunn                      | ASG22      |
| W. Utana and a second                 | Baldock Richard         | FAE12      | Х        | Sonn Nico                             | ASG51      |
|                                       | Barlage Bernhard        | AED13      |          | Steininger Eric                       | AED32      |
|                                       | Bayer Thomas            | ASA42      | Х        | Stritter Rene                         | AED11      |
|                                       | Brune Holger            | ASA45      |          | Suess Rudi                            | OTN/ASA44  |
|                                       | Edelhoff Dirk           | AED2       |          | Wagner Klaus                          | ASG22      |
|                                       | Fehringer Alexander     | ASG13      | Х        | Wietbrock Walter                      | AET12      |
| Х                                     | Fricke Wolfgang Dr.     | AED 65     |          | Wöhler Hans                           | ASG22      |
|                                       | Geiger Hermann          | ASA42      |          | Wössner Ulrich                        | ASE252     |
|                                       | Grasl Andreas           | OTN/ASA44  | Х        | Theunissen Martijn/Dutch Space        | ASA43      |
|                                       | Grasshoff Brigitte      | AET12      | Х        | Martin Olivier                        | ASA43      |
| Х                                     | Hamer Simon             | Terma      | <b>1</b> |                                       |            |
| X                                     | Hendry David            | Terma      |          |                                       |            |
|                                       | Hengstler Reinhold      | ASA42      |          |                                       |            |
|                                       | Hinger Jürgen           | ASG22      |          |                                       |            |
| X                                     | Hohn Rüdiger            | AED65      |          |                                       |            |
|                                       | Hölzle Edgar Dr.        | AED32      |          |                                       |            |
|                                       | Huber Johann            | ASA42      |          |                                       |            |
|                                       | Hund Walter             | ASE252     |          |                                       | <u> </u>   |
|                                       | Idler Siegmund          | AED312     |          |                                       | <u> </u>   |
|                                       | Ivády von András        | FAE12      |          |                                       |            |
|                                       | Jahn Gerd Dr.           | ASG22      |          |                                       |            |
|                                       | Kalde Clemens           | ASM2       |          |                                       |            |
|                                       | Kameter Rudolf          | OTN/ASA42  |          |                                       |            |
|                                       | Kettner Bernhard        | AET42      |          |                                       |            |
|                                       | Knoblauch August        | AET32      | Х        | Alcatel Alenia Space Cannes           | AAS-F      |
| Х                                     | Koelle Markus           | ASA43      |          | Alcatel Alenia Space Torino           | AAS-I      |
| Х                                     | Koppe Axel              | AED312     | Х        | ESA/ESTEC                             | ESA        |
| Х                                     | Kroeker Jürgen          | AED65      |          |                                       |            |
| Х                                     | La Gioia Valentina      | Terma      |          | Instruments:                          |            |
| · · · · · · · · · · · · · · · · · · · | Lang Jürgen             | ASE252     |          | MPE (PACS)                            | MPE        |
|                                       | Langenstein Rolf        | AED15      | Х        | RAL (SPIRE)                           | RAL        |
|                                       | Langfermann Michael     | ASA41      |          | SRON (HIFI)                           | SRON       |
| Х                                     | Maukisch Jan            | ASA43      |          |                                       |            |
| Х                                     | Much Christoph          | ASA43      |          |                                       |            |
|                                       | Müller Jörg             | ASA42      |          | Subcontractors:                       |            |
| Х                                     | Müller Martin           | ASA43      |          | Alcatel Alenia Space Antwerp          | ABSP       |
|                                       | Peltz Heinz-Willi       | ASG13      |          | Austrian Aerospace                    | AAE        |
|                                       | Pietroboni Karin        | AED65      |          | Austrian Aerospace                    | AAEM       |
|                                       | Platzer Wilhelm         | AED2       |          | BOC Edwards                           | BOCE       |
|                                       | Reichle Konrad          | ASA42      |          | Dutch Space Solar Arrays              | DSSA       |
|                                       | Runge Axel              | OTN/ASA44  |          | EADS Astrium Sub-Subsyst. & Equipment | ASSE       |
|                                       | Schink Dietmar          | AED32      |          | EADS CASA Espacio                     | CASA       |
|                                       | Schlosser Christian     | OTN/ASA44  |          | EADS CASA Espacio                     | ECAS       |
|                                       | Schmidt Rudolf          | FAE12      |          | European Test Services                | ETS        |
|                                       | Schmidt Thomas          | ASA42      |          | Patria New Technologies Oy            | PANT       |
|                                       | Schuler Günter          | ASA42      |          | SENER Ingenieria SA                   | SEN        |

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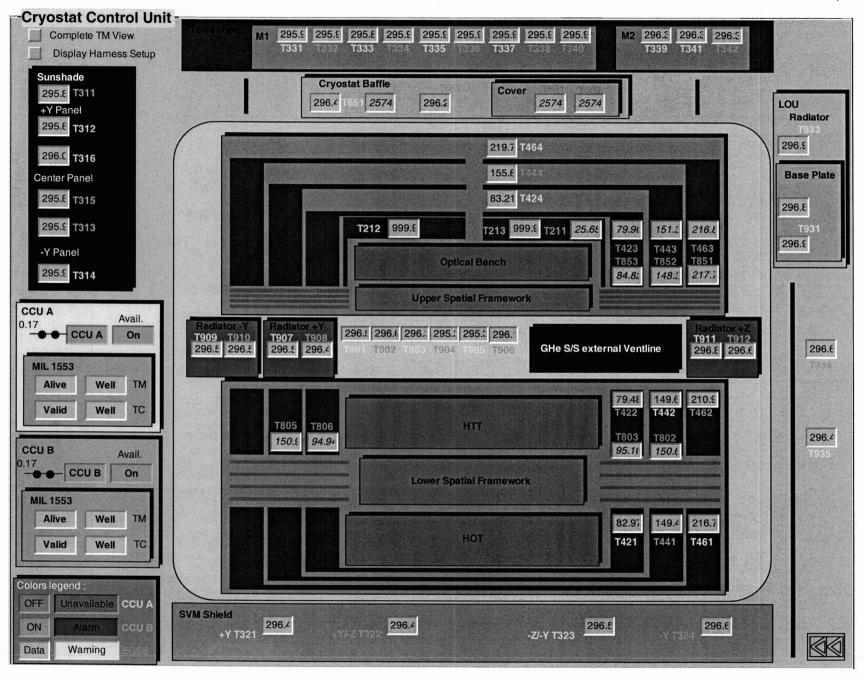
Issue: 2.0 Date: 17.02.09

DS: 65535 ID: CCU\_OP Title: MIMICS DISPLAY Sample Tim

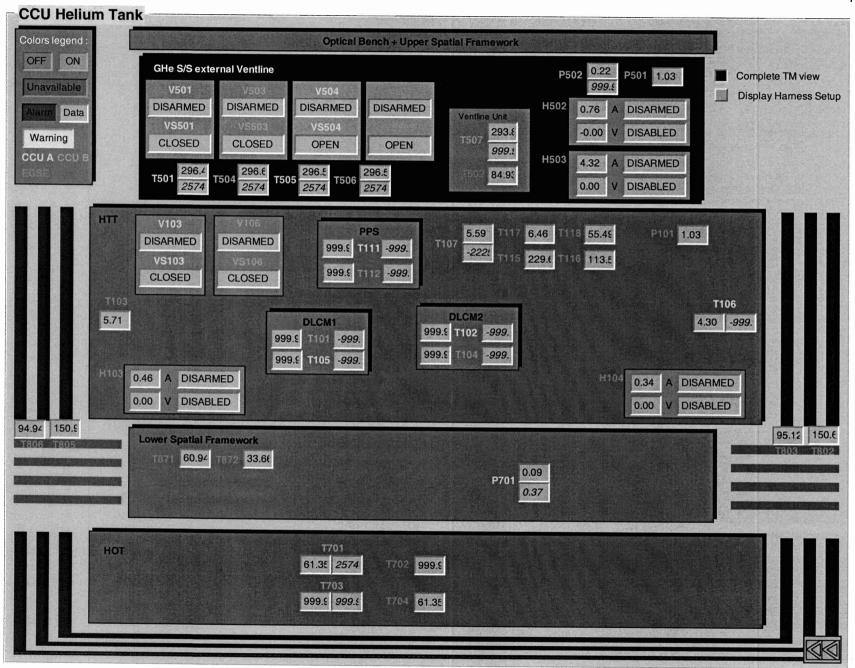
Sample Time: 2009.058.00.38.15.011 Workstation: hpws25

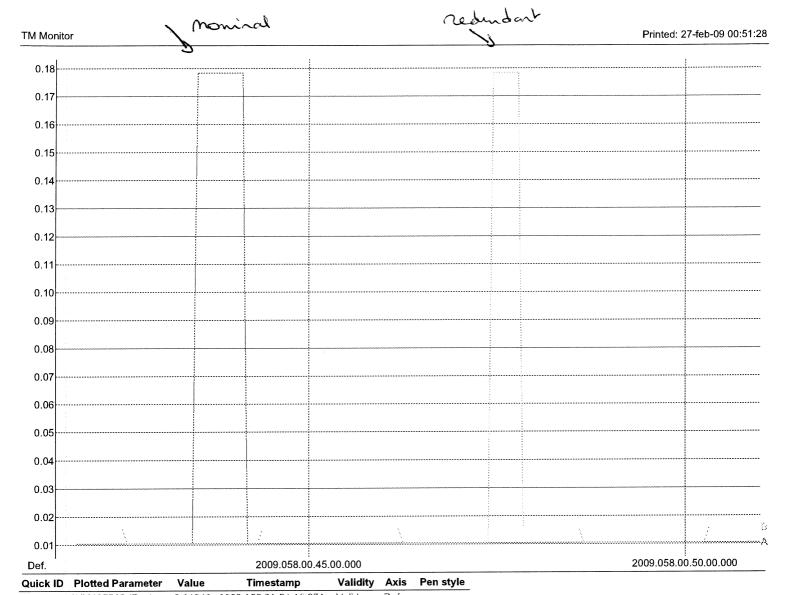


DS: 65535 ID: CCU Title: MIMICS DISPLAY Sample Time: 2009.058.00.38.35.011 Workstation: hpws25



DS: 65535 ID: CCU\_HE Title: MIMICS DISPLAY Sample Time: 2009.058.00.38.45.011 Workstation: hpws25





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Connectors that are shaded YELLOW are connected to the CCU. Connectors with no shading are connected to the Cryo SCOE

| L. | SCOE Connector | Spacecraft<br>Connector | ccu                    |                  |                  |                  |  |                        |                   | 7                   | Sensors Alloc                          | ated to the Spac                       | ecraft Connecto  | rs               |                  |          |          |          |         |
|----|----------------|-------------------------|------------------------|------------------|------------------|------------------|--|------------------------|-------------------|---------------------|--|--|------------------|------------------|------------------|----------|----------|----------|---------|
|    | J07, J15       | 315100-J01              | Cryo-SCOE<br>Cryo-SCOE | T117<br>(C100)   | T118<br>(C100)   | T207<br>(PT1000) | T211<br>(PT1000)                       | T238<br>(PT1000)       | T239<br>(PT1000)  | T249<br>(PT1000)    | T251<br>(PT1000)                       | T253<br>(PT1000)                       | T255<br>(PT1000) | T423             | T443<br>(PT1000) | T463     | T851     | T852     | T85     |
|    | J01, J17       | 315100-J03              | Cryo-SCOE<br>Cryo-SCOE | T702<br>(C100)   | T872<br>(C100)   | P101             | T103<br>(PT1000)                       | T115<br>(PT1000)       | T116<br>(PT1000)  | T704<br>(PT1000)    | T802<br>(PT1000)                       | T803<br>(PT1000)                       | T805<br>(PT1000) | T806<br>(PT1000) | T871<br>(PT1000) | (P11000) | (PT1000) | (PT1000) | (PT100  |
|    | J14            | 315100-J05              | CCU-A                  | T331<br>(PT1000) | T333<br>(PT1000) | T335<br>(PT1000) | T337<br>(PT1000)                       | T339<br>(PT1000)       | T341<br>(PT1000)  |                     |  |  | ((1,1,0,0)       | (111000)         | (211000)         |          |          |          |         |
|    | J10            | 315100-J06              | ССИ-В                  | T332<br>(PT1000) | T334<br>(PT1000) | T336<br>(PT1000) | T338<br>(PT1000)                       | T340<br>(PT1000)       | T342<br>(PT1000)  |                     |  |  |                  |                  |                  |          |          |          |         |
|    | J20            | 316100-J01              | CCU-A                  | VS501            | VS504            | V501             | V504                                   | <u> </u>               | (                 |                     |  |  | -                |                  |                  |          |          |          |         |
|    | J20            | 316100-J02              | CCU-B                  | VS503            | VS505            | V503             | V505                                   |                        |                   | -                   |  | <u> </u>                               |                  |                  |                  |          |          |          |         |
|    | J11            | 321100-J01              |                        | L701             | H701             | V105             | V701                                   |                        |                   |                     |  |  |                  |                  |                  |          |          |          |         |
| L  | J03            | 321100-J02              |                        | L702             | H702             | V702             | 17701                                  | <del> </del>           |                   | <u> </u>            |  |  |                  |                  |                  |          |          |          |         |
|    | J06            | 321100-J03              |                        | H502             | H503             | 1102             |  | 1                      |                   | ļ                   |  |  |                  |                  |                  |          |          |          |         |
| _  | J01            | 321100-J04              |                        | P501             |                  |                  |  | +                      |                   |                     |  | ļ                                      |                  |                  |                  |          |          |          |         |
|    | J11            | 321100-J05              | Cryo-SCOE<br>Cryo-SCOE | H103             | H701             | L102             | VT102<br>(PT1000)                      | VT103<br>(PT1000)      | VT105             | VT701<br>(PT1000)   | VH102                                  | VH103                                  | VH105            | VH701            | VS102            | VS105    | VS701    | V102     |         |
|    | J03            | 321100-J06              | Cryo-SCOE<br>Cryo-SCOE | H104             | H702             | L101             | VT104<br>(PT1000)                      | VT106<br>(PT1000)      | VT702<br>(PT1000) | VH104               | VH106                                  | VH702                                  | VS104            | VS702            | V104             |          |          |          |         |
| L  | J06            | 321100-J07              |                        | H501             |                  |                  | The state of the state of the state of | A ST SER SERVICE STORY |                   |                     |  |  |                  |                  |                  |          |          |          |         |
|    | J01            | 321100-J08              |                        | T502<br>(PT1000) |                  |                  |  |                        |                   |                     |  |  |                  |                  |                  |          |          |          |         |
|    | J05            | ????                    |                        | T801             | T602             |                  |  |                        |                   |                     |  |  |                  |                  |                  |          |          |          |         |
|    | J08            | 321200-J01              | С                      | T202<br>(C100)   | T212<br>(C100)   | T221<br>(C100)   | T223<br>(C100)                         | T227<br>(C100)         | T228<br>(C100)    | T232<br>(C100)      | T234<br>(C100)                         | T236<br>(C100)                         | T242<br>(C100)   | T244             | T246             | T250     | T254     | T258     | T424    |
|    | J04            | 321200-J02              | C<br>U                 | T102<br>(C100)   | T105<br>(C100)   | T106<br>(C100)   | T111<br>(C100)                         | PR_P701                | T421<br>(PT1000)  | T442<br>(PT1000)    | T461<br>(PT1000)                       | H101                                   | (0100)           | (C100)           | (C100)           | (C100)   | (C100)   | (C100)   | (PT1000 |
|    | J09            | 321200-J03              | -                      | T321<br>(PT1000) | T323<br>(PT1000) | T501<br>(PT1000) | T505<br>(PT1000)                       | T651<br>(PT1000)       | T901<br>(PT1000)  | T903<br>(PT1000)    | T907<br>(PT1000)                       | T911<br>(PT1000)                       |                  |                  |                  |          |          |          |         |
|    | J09            | 321200-J04              | A                      | T312<br>(PT1000) | T314<br>(PT1000) | T316<br>(PT1000) | T905<br>(PT1000)                       | T909<br>(PT1000)       | T931<br>(PT1000)  | T933<br>(PT1000)    | T935<br>(PT1000)                       |  |                  |                  |                  |          |          |          |         |
|    | J04            | 321200-J05              |                        | VS103            | H101             | V103             |  |                        |                   | <u> </u>            | (* * * * * * * * * * * * * * * * * * * |  |                  |                  |                  |          |          |          |         |
|    | J02            | 321300-J01              | С                      | T208<br>(C100)   | T213<br>(C100)   | T222<br>(C100)   | T224<br>(C100)                         | T225<br>(C100)         | T226<br>(C100)    | T231<br>(C100)      | T233<br>(C100)                         | T235<br>(C100)                         | T237<br>(C100)   | T247<br>(C100)   | T248<br>(C100)   | T252     | T256     | T862     | T444    |
|    | J04            | 321300-J02              | c<br>u                 | T101<br>(C100)   | T104<br>(C100)   | T107<br>(C100)   | T112<br>(C100)                         | T703<br>(C100)         | T422<br>(PT1000)  | T441<br>(PT1000)    | T462<br>(PT1000)                       | T701<br>(PT1000)                       | H102             | (0100)           | (C100)           | (C100)   | (C100)   | (C100)   | (PT1000 |
|    | J18            | 321300-J03              | -                      | P502             | T322<br>(PT1000) | T324<br>(PT1000) | T504<br>(PT1000)                       | T506<br>(PT1000)       | T507<br>(PT1000)  | T652<br>(PT1000)    | T902<br>(PT1000)                       | T908<br>(PT1000)                       | T912<br>(PT1000) |                  |                  |          |          |          |         |
|    | J14            | 321300-J04              | В                      | T311<br>(PT1000) | T313<br>(PT1000) | T315<br>(PT1000) | T904<br>(PT1000)                       | T906<br>(PT1000)       | T910<br>(PT1000)  | T932<br>(PT1000)    | T934<br>(PT1000)                       | (, , , , , , , , , , , , , , , , , , , | (11100)          |                  |                  |          |          |          |         |
|    | J04            | 321300-J05              |                        | VS106            | H102             | V106             |  |                        | ,                 | ,                   | ( 1000)                                |  |                  |                  |                  |          |          |          |         |
|    | J18            | CVSE I/F                | Cryo-SCOE              | CVSEVE           |                  |                  | CHECK                                  | CVSEUF                 | CVSE I/F          | T Party Time season | CVSE I/F                               |  |                  |                  |                  |          |          |          |         |







# 6 Appendix 3: Herschel PCDU & CDMS Nominal Switch On/Off Procedure As-Run Procedure

(re

f. HP-2-ASED-PR-0070, issue 5 + ACS: HP-2-ASED-SD-0471 Issue 1)

Doc. No: HP-2-ASED-TR-0340

Issue:

Date: 04.03.09

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Title:

Herschel PCDU & CDMS nominal switch on / off procedure

CI-No:

|                        |                         | Date                           |
|------------------------|-------------------------|--------------------------------|
| Prepared by:           | Functional AIT Team     | 17 <sup>th</sup> February 2009 |
|                        | C. Much                 | 18/02/09                       |
| Checked by:            | C. Much                 | 13.02103                       |
| Product Assurance:     | J. Hall AMALL           | 18/2/2009.                     |
| Configuration Control: | W. Wietbrock            |                                |
| TASF Engineering       | F. Chatte               | 1912/2009                      |
|                        |                         |                                |
| TASF Test Director     | N/A                     |                                |
| Project Management:    | Dr. W. Fricke / R. Hghn | 19.07.09                       |
| Project Management:    | D. Montet               | 19.08.09                       |

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| Issue | Date       | Sheet | Description of Change  | Release |
|-------|------------|-------|--|---------|
| 1     | 22.05.2007 | All   | Initial version  |         |
| 2     | 17.07.2008 | All   | Cover page - new   |         |
|       |            |       | Section 7.5 – Power On Update  |         |
|       |            |       | Section 7.7 – Power Off Update   |         |
|       |            |       | Distribution list – new  |         |
| 3     | 19.08.2008 | All   | Location / Operator / PA / Date footer added                                       |         |
|       |            |       | Section 7.5 - Power On GUI added   |         |
|       |            |       | Section 7.7 – Power Off Update   |         |
| 4     | 27.01.2009 | All   | Section 7.5 – Added Critical Param Check   |         |
|       |            |       | CCU switch on  |         |
|       |            |       | SSMM Option  |         |
|       |            |       | Section 7.7 – Added CCU & SSMM Off   |         |
| 5     | 17.02.2009 | All   | Section 7.5 – Add options to define packet store, load OBCPs and initialise OBQ    |         |
|       |            |       | Section 7.7 – Add options to dump packet stores, delete packet store, and stop MTL |         |
|       |            |       |  |         |
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# 1 Scope

# 1.1 Objective

This Procedure represents the nominal Herschel PCDU & CDMS switch on / off procedure to support electrical integrations and electrical tests.

# 1.2 Operational Flow

In paragraph 7 is provided the detailed step-by-step test procedure.

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# 2 Documents/Drawings

#### 2.1 Applicable Documents

The following documents form a part of this document to the extent specified herein. Unless an issue is quoted for a document, the current issue is deemed to apply. When an issue is quoted, this issue and no other must be used.

AD-1 Herschel / Planck EGSE – Service Module Configuration Commissioning Procedure

H-P-2-PR-AI-0039

#### 2.2 Reference Documents

N/A

#### 2.3 Other Documents

N/A

### 2.4 Acronyms

The following terms and definitions are specific to this document and to Herschel Project.

| 1553  | MIL-STD-1553B conform communication interface |
|-------|---|
| A A D | Attitude Anomaly Detector                     |

AAD Attitude Anomaly Detector
ACC ACMS Control Computer

ACMS Attitude Control and Measurement Subsystem

AIR ACC In Reconfiguration

AIT Assembly, Integration and Test

AIV Assembly, Integration and Verification

APID Application Process ID
ASW Application Software

AVM Avionics Model

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BSW Basic Software

CBH Cathalyst Bed Heater

CCS Central Check-out System

CCSDS Consultative Committee for Space Data Systems

CDMU Control and Data Management Unit

CDMS Control and Data Management Sub-system

CIR CDMU In Reconfiguration

CLCW Command Link Control Word

CLTU Command Link Transmission Unit

CPDU Command Pulse Distribution Unit

CRS Coarse Rate Sensor

CTR Central on board Reference Time

EEPROM Electrically Erasable PROM

EGSE Electrical Ground Support Equipment

FCL Fold-back Current Limiter

FCV Flow Control Valves

FDIR Failure Detection, Isolation, and Recovery

GDIR General Design and Interface Requirement

GRP Group Heaters Switch

HBR High Bit Rate

HL/HLC High Level command

HP/HPC High Priority commands

HPSDB Herschel Planck System Data Base

HW Hardware

I/F InterFace

I/O Input/Output

ICD Interface Control Document

IST Integrated System Test

LV Latching Valves

LBR Low Bit Rate

MAP Multiplexed Access Point

MBR Medium Bit Rate

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ML 16 Memory Load command (ML 16)

MM Memory Module

MOIS Mission Operations Information System

MTL Mission Timeline

NRZ-L Non Return to Zero – Litton

OBCP On-Board Control Procedure

OBDH On-Board Data Handling

OBMF On-Board Monitoring Function

OBRT/OBT On-Board Reference Time

OIRD Operation Interface Requirement Document

P/L Payload

PCDU/PCS Power Control Distribution Unit/Power Control Subsystem

PM Processor Module

PROM Programmable Read Only Memory

PSK Phase Shift Keying

RA Rate Anomaly

RAM Random Access Memory

RCS Reaction Control Subsystem

RF Radio Frequency

RM Reconfiguration Module

RT 1553 Remote Terminal

RWL Reaction Wheel Assebly

SA 1553 Remote Terminal Sub Address

SAS Sun Acquisition Sensor

SCOE Special Check-out Equipment

SIR S/C In Reconfiguration

SIT Subsystem Integrated Test

SP Sun Pointing

SSMM Solid State Mass Memory

STR Star Tracker

SVM Service Module

SW Software

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# Herschel

TAI International Atomic Time

TC TeleCommand

TFG Transfer Frame Generator

TM TeleMetry

TTC Telemetry Tracking & Command subsystem

TTR Telemetry Telecommand and Reconfiguration

UFT Unit Functional Test

VC Virtual Channel

WD Watchdog

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# 3 Requirements to be verified

N/A

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- 4 Configuration
- 4.1 Herschel S/C Configuration
- 4.1.1 Hardware Configuration

The activities described in this test procedure require the complete SVM configuration.

# 4.1.2 Software Configuration

The PCDU & CDMS Switch On / Off will be run with the following on-board software configuration:

• CDMS OBSW: the actual SW version shall be used

# 4.1.3 Test Configuration

N/A

# 4.1.4 Simulated Equipments

N/A

# 4.2 Set-up

N/A

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#### **Conditions** 5

#### 5.1 **Personnel**

| Responsibility | Name / Organization |
|----------------|---------------------|
| EGSE Operator  |                     |

#### 5.2 **Environmental**

N/A

#### 5.3 **General Precautions and Safety**

#### 5.3.1 General Safety Requirements, Precautions

### Special condition and hazards

The following Operational restrictions shall be carefully taken into account:

In case of any failure, the activities shall be stopped until troubleshooting plan is generated and approved.

#### 5.3.2 ESD constraints

N/A

#### 5.3.3 Special QA Requirements

N/A

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5.4 **GSE** 

5.4.1 MGSE

N/A

5.4.2 CVSE

N/A

5.4.3 EGSE

### 5.4.3.1 EGSE Hardware Configuration

| S/S  | Unit       | Configuration |  | SCOE<br>simulated<br>eqpts | Remarks |  |
|------|------------|---------------|--|----------------------------|---------|--|
|      |            | Herschel      |  |                            |         |  |
| EGSE | ccs        | 1             |  |                            |         |  |
|      | TM/TC DFE  | 1             |  |                            |         |  |
|      | POWER SCOE | 1             |  |                            |         |  |

#### 5.4.3.2 EGSE User Software

CCS the actual SW version shall be used

• LPS/SAS SCOE the actual SW version shall be used

HPSDB the actual SW version shall be used

5.4.3.3 Grounding Configuration

N/A

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5.4.3.4 Test Equipment

N/A

5.4.3.5 Data Acquisition System

N/A

5.4.4 OGSE

N/A

5.4.5 Special Equipment

N/A

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# 6 Verification Requirements and Test Criteria

N/A

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# Herschel

#### 7 **Step by Step Procedure**

#### 7.1 CCS login, session start up and standard operator HCl set up

| Step- | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|-------|--|------------------|-----------|-----------------|---|---|
| 10    | Verify the S/C Switch-On sheet (at the window), if S/C (PCDU & CDMS) is allowed to be switched on  |                  |           |                 |   |   |
| 20    | Make initial entries into the Logbook  |                  |           |                 |   |   |
| 30    | Verify "Red Hat Login window" is displayed and ready for   |                  |           |                 |   |   |
|       | At rightmost double screen workstation (left screen)   |                  |           |                 |   |   |
| 40    | Perform Log on as Test Conductor to the CCS system at both operator double screen workstations and write into the "Remarks" column  • Username: heregse or hercdmu (during IST)  • Password: hertest hertest | Pass             |           |                 |   |   |

| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|----------|--------|----------|--------------------|-------|-------|
|          |        |          |                    |       |       |
|          |        |          |                    |       |       |

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| Step- | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|-------|--|------------------|-----------|-----------------|---|---|
| 50    | <ul> <li>Open the "Session Manager System Window" HPCSS</li> <li>click (1x) on the desktop icon "Start MMi"</li> <li>verify if a.m. window appears</li> </ul>  | Pass             |           | Value           |   |   |
| 60    | Open the "Session Manager Execution Window" REALTIME for starting a Test Session  • from "Session Manager System Window" HPCSS Execution → Start  • verify if a.m. window appears.   | Pass             |           |                 |   |   |
| 70    | Prepare start of a Test Session in the "REALTIME Window"   | Pass             |           |                 |   |   |
| 80    | Start the Test Session in the "REALTIME Window"  Click on "Start" button  Update logbook with Test Session and Environment name  Wait for ca. 4 minutes  verify Status in "Session Manager System Window" HPCSS changes from INIT to RUN | Pass             |           |                 |   |   |
| 90    | Verify Session Status in the "REALTIME Window"  • RUN and NOT  | Pass             |           |                 |   |   |

| Test lo | ation: | Operator | Product-Assurance: | Date: | Time: |
|---------|--------|----------|--------------------|-------|-------|
|         |        |          |                    |       |       |
|         |        |          |                    |       |       |

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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|--|------------------|-----------|-----------------|---|---|
| 100          | <ul> <li>Connect to an already running Test Session</li> <li>in the "REALTIME Window" click on Join button</li> <li>verify on the CCS Desktop that a top banner SCOS 2000 and a bottom LOG window appears</li> <li>verify Session Status in the "REALTIME Window" RUN-RUN</li> </ul>   | Pass             |           | ¥ and           |   |   |
| 110          | To avoid unintentionally stop a the running test session  • minimize the "Session Manager System Window"  HPCSS  | Pass             |           |                 |   |   |
| 120          | Configure the HCI:  From the "Session Manager Execution Window" REALTIME  open "HPCSS Test Conductor Console Window" with Desktop -> Test Sequences -> Console and move window to upper left corner  open the "SCOS 2000 Command History Window" with Desktop -> Commanding -> Command History, resize the window (smaller) and put it at the bottom | Pass             |           |                 |   |   |

| Test lo | ation: | Operator | Product-Assurance: | Date: | Time: |
|---------|--------|----------|--------------------|-------|-------|
|         |        |          |                    |       |       |
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| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|-------|---|------------------|-----------|-----------------|---|---|
|       | At rightmost double screen workstation (right screen)   | VAIGU            |           | VAIUE           |   |   |
| 130   | Configure the HCI From the "Session Manager Execution Window" REALTIME  • open "Telemetry Packet History Display" with Desktop -> Monitoring -> Packet History -> LIVE, resize window (smaller) and put at top of screen • open "Telemetry Packet History Display" with Desktop -> Monitoring -> Packet History -> STOP, Set Filter APID=16 -> LIVE, resize window (smaller) and put at middle of screen • open "Onboard Event Display Window" with Desktop -> Monitoring -> Onboard Event History -> LIVE, resize window (smaller) and put at bottom of screen | Pass             |           |                 |   |   |
|       | At leftmost double screen workstation (left screen)   |                  |           |                 |   |   |
| 140   | <ul> <li>Perform Join to a running Test Session (1)</li> <li>Open the "Session Manager System Window"         HPCSS by click (1x) on the desktop icon "Start Mmi"</li> <li>verify if a.m. window appears</li> </ul>   | Pass             |           |                 |   |   |

| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|----------|--------|----------|--------------------|-------|-------|
| į.       |        | •        |                    | Date. | Time. |
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| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|-------|---|------------------|-----------|-----------------|---|---|
| 150   | Join a running Test Session (2)   | Pass             |           |                 |   |   |
| 160   | Join a running Test Session (3)  • From the "Session Manager Execution Window" REALTIME click on Join  • Wait for Session Status RUN-RUN  | Pass             |           |                 |   |   |
| 170   | Configure the HCI From the "Session Manager Execution Window" REALTIME  • open "Telemetry Desktop Window" with Desktop -> Monitoring -> Monitoring Desktop -> MIM (Synoptics)  • select Power (UL) GEN_POWER -> Apply • select LCL (UR) LCL_HERSCHEL -> Apply • select Heaters & FCL (LL) HEATERS -> Apply • select SAT (LR) SAT -> OK • click on Resize -> Large medium • click on List -> available synoptics shown • click on 4 (right of List) • click on List • resize 4 Large | Pass             |           |                 |   |   |

| Test lo | cation: | Operator | Product-Assurance: | Date: | Time: |
|---------|---------|----------|--------------------|-------|-------|
|         |         |          |                    |       |       |
|         |         |          |                    |       |       |

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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|---|------------------|-----------|-----------------|---|---|
|              | At leftmost double screen workstation (right screen)  |                  |           |                 |   |   |
| 180          | Configure the HCI From the "Session Manager Execution Window" REALTIME  • open "Telemetry Window" with Desktop -> Monitoring -> Monitoring Desktop -> AND (Alpha Numeric) and select all essential low / high HK  • select TM/TC DFE HK parameters 1-3: YAHK 1946, 2946, 3946 -> Apply  • select BS SCOE HK parameters: YAHK1956 -> Apply  • select LPS SCOE HK parameters 1-2, 2-2: YAHK1952, 2952 -> OK  • click on List • Resize 4 large | Pass             |           |                 |   |   |

| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|----------|--------|----------|--------------------|-------|-------|
| 1        |        | ·        |                    |       |       |
|          |        |          |                    |       |       |
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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|--|------------------|-----------|-----------------|---|---|
|              | Switch on Bus Monitor at CDMU SCOE Workstation (set-3)   |                  |           |                 |   |   |
|              | Verify at TM/TC rack in MIL-1553B BUS if Monitor is switched on (green light)?   |                  |           |                 |   |   |
| 190          | User H-P_user<br>Password H-P  |                  |           |                 |   |   |
|              | IF Monitor not already running, click 2x on Shortcut to StartBM.bat  |                  |           |                 |   |   |
|              | Verify that MIL-STD-1553b Bus Monitor and Raw Data windows appear MIL-STD -> Mode -> On-line Mode MIL-STD -> Mode -> Start New Acquisition |                  |           |                 |   |   |

| Test lo | cation: | Operator | Product-Assurance: | Date: | Time: |
|---------|---------|----------|--------------------|-------|-------|
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#### 7.2 TM/TC DFE nominal switch on

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value                          | Р | N |
|--------------|---|------------------|-----------|--|---|---|
|              | At the TM/TC DFE rack   |                  |           |  |   |   |
| 10.          | Switch on the "Insulation Transformer" (at bottom left, if not already ON) Note: Sometimes it is necessary to switch on also the bottom mid breaker | Pass             |           |  |   |   |
|              | At the TM/TC DFE PC   |                  |           |  |   |   |
| 20.          | Switch on the "User Workstation" (black button) Verify the boot is successfully completed   | Pass             |           | **************************************   |   |   |
|              | At the TM/TC DFE rack   |                  |           |  |   |   |
| 30.          | Switch on the External Interface Unit "EIU".  | Pass             |           | 7-11-11-11-11-11-11-11-11-11-11-11-11-11 |   |   |
| 40.          | During system power-up verify the LED's on the EIU Front Panel come on and He TM/TC EIU at screen   | LED's<br>On      |           |  |   |   |
| 50.          | Switch on the TM/TC "Baseband Processor" and wait for it to boot. (Kippschalter)  | Pass             |           |  |   |   |

| <del>-</del>   |          |                    |       |       |
|----------------|----------|--------------------|-------|-------|
| Test location: | Operator | Product-Assurance: | Date: | Time: |
|                | 1        |                    |       |       |
|                |          |                    |       |       |
|                |          |                    |       |       |
| L              |          |                    |       |       |

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| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | P | N |
|-------|---|------------------|-----------|-----------------|---|---|
| 60.   | During system power-up verify that multiple LED's on the TM/TC "Baseband Processor Front Panel" will light. Wait until number of lighting LED's is reduced.             | LED's<br>On      |           |                 |   |   |
|       | At the TM/TC DFE PC   |                  |           |                 |   |   |
| 70.   | Log-on as User: H-P_User Password: H-P  | Pass             |           |                 |   |   |
| 80.   | Start ikon SysCtrl.exe Verify that the TM/TC DFE CMS software is automatically started.   | Started          |           |                 |   |   |
| 90.   | Bring "System Status Window" into front. From the "System Status Window" → System Page → System State Box → Operation Mode Verify that this label is set to 'Off-line'. | Offline          |           | -               |   |   |
| 100.  | From the "System Status Window" → System Page → System State Box → Control Mode Verify that this label is set to 'Remote'.  | Remote           |           |                 |   |   |
| 110.  | From the "System Status Window" → System Page → System State Box → Last System BIST Result, Verify that this label is set to 'Passed'.                                  | Passed           |           |                 |   |   |

| Test lo | ation: | Operator | Product-Assurance:     | Date:  | Time: |
|---------|--------|----------|------------------------|--------|-------|
| l       |        | - F      | , reader lead and lead | - 4.0. |       |
| 1       |        |          |                        |        |       |
|         |        |          |                        |        |       |
|         |        |          |                        |        |       |

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### Herschel

### 7.3 BS SCOE nominal switch on => in Cleanroom

| Step-<br>No. | Te       | est-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value                        | Р | N |
|--------------|----------|---|------------------|-----------|--|---|---|
|              | At       | the BS SCOE rack (right)  |                  |           |  |   |   |
| 10.          | Sv       | witch on the SCOE rack power (key, down left)   | ОК               |           | ······································ |   |   |
|              | At       | the BS SCOE PC (left)   |                  |           |  |   |   |
| 20.          |          | witch on the SCOE controller and wait until the oot of the operating system is finished   | OK               |           |  |   |   |
| 30.          | Lo       | og in as SCOE user.<br>sername: hpp<br>assword: HPP_us -> GO  | ОК               |           |  |   |   |
| 40.          | St       | art the SCOE application by clicking on the COE icon (H-P BS) (1x)  | ОК               |           |  |   |   |
| 50.          | Or<br>pa | the popped up H-P BS SCOE window "Startup<br>rameters" select the value for<br>ayload Model: HERSCHEL<br>Startup method: NORMAL -> OK | Pass             |           |  |   |   |
| 60.          | Ve       | rify in the H-P BS SCOE window the SCOE ate is "LOCAL"  | ОК               |           |  |   |   |

| Tarth    |        | <b>-</b> |                    |       |       |
|----------|--------|----------|--------------------|-------|-------|
| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|          |        |          |                    |       |       |
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| Step-<br>No. | Test-Step-Description                    | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|--|------------------|-----------|-----------------|---|---|
|              | Verify in the H-P BS SCOE window the S/C |                  |           |                 |   |   |
| 70.          | interface is "OFFLINE"                   | OK               |           |                 |   |   |
|              | Wait for 100 % Selftest: PASSED          |                  |           |                 |   |   |

#### 7.4 LPS/SAS SCOE nominal switch on => in Cleanroom

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|--|------------------|-----------|-----------------|---|---|
|              | At the SAS SCOE rack   |                  |           |                 |   |   |
| 10.          | Switch on the MITU on front panel of the rack 1 (black button, down left)  | ок               |           |                 |   |   |
| 20.          | Switch on the rack 2 and the rack 3, pressing the green button on the front side of the racks (bottom of 2, top of 3)            | ок               |           |                 |   |   |
| 30.          | Switch on the ELGAR SAS controller Slave (bottom) and wait 20 sec.  Draw and open the rack 2 ELGAR Monitorscreen at rack 2 (mid) | OK               |           |                 |   |   |
| 40.          | Switch on the ELGAR SAS controller Master (up)   | OK               |           |                 |   |   |

| Test location: | Operator Product-Assurance: Da |   | Date: | Time: |
|----------------|--------------------------------|---|-------|-------|
|                |                                |   |       |       |
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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|---|------------------|-----------|-----------------|---|---|
|              | At the SAS SCOE PC  |                  |           |                 |   |   |
| 50.          | Switch on the PC workstation Note: sometimes it may take longer, due to scan disc   | ОК               |           |                 |   |   |
| 60.          | Login as "Normal LPS SCOE operator" User: hpp Password: HPP_us -> GO  | ок               |           |                 |   |   |
| 70.          | Verify at the ELGAR Master PC Monitor (rack 2) if LPS/SAS SCOE is started. Application is correct when screen shows all values in a matrix. | ОК               |           |                 |   |   |
| 80.          | Start the LPS/SAS SCOE Application SW by clicking on the "H-P LPS" icon (1x)  | ОК               |           |                 |   |   |
| 90.          | <ul> <li>Into the "Startup Parameter" window select</li> <li>Payload model: Herschel</li> <li>Startup method: NORMAL -&gt; OK.</li> </ul>   | ок               |           |                 |   |   |
| 100.         | Into the "Operator Comment" window confirm the installed harness is the same of the S/C model selected, type in "yes" -> OK                 | ОК               |           |                 |   |   |
| 110.         | Verify the SelfTest, connections, etc. is started and wait until it is 100% finished. (ca. 10 min)  | ОК               |           |                 |   |   |

| Test location: | Operator | Product-Assurance: | Date: | Time: |
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| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|-------|---|------------------|-----------|-----------------|---|---|
| 120.  | Verify into the "H-P LPS SAS SCOE" main window the following fields:  • Selftest State: Passed (green coloured).  • SCOE State: LOCAL  • SCOE activity: IDLE  • S/C interface: ISOLATED | ОК               |           |                 |   |   |

| Test location: | Operator | Product-Assurance: | Date: | Time: |
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7.5 S/C Power ON

7.5.1 PCDU & CDMS Power ON

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value |                            | P | N |
|--------------|--|------------------|-----------|-----------------|----------------------------|---|---|
| 10.          | From "HPCCS Conductor Console" window select File -> Start -> Select -> Z010999MCVT001_POWER_ON_HER_IST Select the following on the GUI:  • TC Decoder = A • CDMU Processor = PM A1 • LPS/SAS = SAS with all channels ON LPS MOPE • Battery = Simulated • Voltage = 25.4V • BDR Closure = Nominal Case | Confirm          |           | Value           | changes as per ACS SD-6471 | V |   |

|      | Test location:    | Operator<br>B. Chen | Product-Aseurance: | Date: 260200 | Time: 23. 19 | ]    |
|------|-------------------|---------------------|--------------------|--------------|--------------|------|
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| Step-<br>No. | Test-Step-Description   | Nominal Tolerance Actual Value Value   | PN |
|--------------|---|--|----|
|              | Select TC decoder  A  B  B  B  B  B  B  B  B  B  B  B  B  | Salect CDMU Processor  PM A1  PM A2  PM B1  PM B2  |    |
|              | Select LPS/SAS as  LPS with channels 1,3,5,7,9,11 ON  SAS with channels 25 to 30 ON  SAS with all channels ON  SAS with all channels ON  Select Batter  voltage  25.4 V  simulated  no battery  | BS Scoe Configuration  BDR closure  (full charged)  A nominal case (BDR closure quickly by SCOE with AIT TC)  Jaunch case (BDR closure done later by CDMS) |    |
| 20.          | Z010999MCVT001_POWER_ON_HER_IST A Popup window occurs asking to verify data reception on TM/TC Data Front End workstation: In window "System Status", check following panels  → TM chain / TM Acquisition synchronised and locked Status expected → View / TM Transfer Frame Monitor TM frame data should be received before few minutes → click the button "OK" to proceed | OK   |    |

|     |          |                |     |          |          |                    | /       |       |    |
|-----|----------|----------------|-----|----------|----------|--------------------|---------|-------|----|
|     | Test loc | ation:         |     | Operator | <b>A</b> | Product-Assurance: | Date:   | Time: |    |
|     |          |                | csa |          | B. che   | K. Goossens &      | 26/2/09 | 23:58 |    |
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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |       |
|--------------|---|------------------|-----------|-----------------|---|---|-------|
| 30.          | Z010999MCVT001_POWER_ON_HER_IST A Popup Window occurs asking to start a new acquisition in Bus Monitor with name IST on the CDMU SCOE: - start a new acquisition by clicking "Menu Mode/Start new Acquisition" If an acquisition is already started, please stop and restart  → click the button "OK" to proceed  After few minutes Data transfer should be visible on the Bus Monitor. | ОК               |           | value           | V |   |       |
| 40.          | D102159SCVT001_GET_ALARM_STATUS Check that both DOD ext1 and ext2 are "Not Asserted". Otherwise execute Operator Note 8  → Click the button "End TS!" to proceed  | End TS           |           | and T           | U | / | 0b:02 |
| 50.          | D102159SCVT001_GET_ALARM_STATUS Check that both DOD ext1 and ext2 are "Not Asserted". Otherwise execute Operator Note 8  → Click the button "End TS!" to proceed  | End TS           |           | G1 73           |   |   | n 20  |

|          | r <del></del>  |       |          |                      |          |         |
|----------|----------------|-------|----------|----------------------|----------|---------|
|          | Test location: |       | Operator | Product-Assurance: / | Date:    | Time:   |
|          |                |       |          |                      | 1 ( -    | Time.   |
|          |                | CS C  | I h che  | K-120040450          | 26/02/28 | 237×2   |
|          |                |       | 3.01     | 1-10000000           | 0101     | 27238   |
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| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value |   | Р | N |       |
|-------|---|------------------|-----------|-----------------|---|---|---|-------|
| 60.   | Z010999MCVT001_POWER_ON_HER_IST  → click the button "YES" to proceed  | YES              |           | yes             |   | V |   |       |
| 70.   | Z010999MCVT001_POWER_ON_HER_IST  → Click the button "End TS!" to proceed  | End TS           |           | end ts          |   | V | / | 00:05 |
| 80.   | D102159SCVT032TIMESYNCRO Wait until the synchronization between CDMS On-board Time and CCS is finished  → Click the button "End TS!" to proceed | End TS           |           | Gd 7)           |   | ~ |   | P:12  |
| 90.   | From "HPCCS Conductor Console" window select File -> Start -> Select -> Z010999MCVT 097_ASDGEN_CRIT_PARS_CHECK                                  | ОК               |           | OK              | Script will continue to monitor in the background |   |   | 0:11  |

|          | Test location:    | Operator | Product-Assurance:        | Date: | Time:     |                  |
|----------|-------------------|----------|---------------------------|-------|-----------|------------------|
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#### 7.5.2 CCU Power ON

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value |   | Р       | N |      |
|--------------|--|------------------|-----------|-----------------|---|---------|---|------|
| 10.          | If required, perform the following to switch on the CCU From "HPCCS Conductor Console" window select File -> Start -> Select -> K102999ECVT001_ASDGENCCU_ABPWRON                                   | ОК               |           | OK              | If this step has been performed then step 20 & 30 must be performed also. | V       |   | 0:20 |
| 20.          | If the CCU is on, the required monitoring mode should be enabled by calling  K102999ECVT001_ASDGENCCU_MnEBOTH1  (For Mode 1 – 512secs) or  K102999ECVT001_ASDGENCCU_MnEBOTH2  (For Mode 2 – 8secs) | ОК               |           | OK              |   | <i></i> |   | 0:32 |

|          | Test location:    | Operator | Product Assurance:  K. Ogysseus & | Date:   | Time: |    |
|----------|-------------------|----------|-----------------------------------|---------|-------|----|
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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value |   | Р | N |      |
|--------------|---|------------------|-----------|-----------------|---|---|---|------|
| 30.          | If the CCU is on, perform the following script to log temperatures  K102999ECVT031_ASDGEN_CCU_LOG                         | ок               |           | OK              | Script will continue to log in the background | 0 | , | u-53 |
| 40.          | If required, connect to the CRYO SCOE by executing the following command from the Test Conductor Console connect PFM_CRYO | ок               |           | 0 (<            |   | _ |   | 0:15 |

|                   |     |          |                    | /          |       |
|-------------------|-----|----------|--------------------|------------|-------|
| Test location:    |     | Operator | Prøduct-Assurance: | ✓ Date:    | Time: |
|                   | CGS | D. che   | K. bassens         | A. 27/2/08 | 0-34  |
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#### 7.5.3 SSMM Power ON

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value   | Tolerance | Actual<br>Value |   | Р | N |
|--------------|--|--------------------|-----------|-----------------|---|---|---|
| 10.          | If required, perform the following to initialise the SSMM  From "HPCCS Conductor Console" window select File -> Start -> Select -> Z010999MCVT005_IST_START_SSMM  Option 0 (A0 & B0) | OK<br>Q<br>Confirm |           |                 | If performed then the Pkt Store Definition must be run in step 50 |   |   |
| 20.          | D102159SCVT186_IST_SSMM_ON  Reply to the prompt "Do you want to continue" "with such configuration?"  Click the button "Continue" to proceed   | Continue           |           |                 |   |   |   |
| 30.          | D102159SCVT186_IST_SSMM_ON  → Click the button "End TS!" to proceed  | End Ts             |           |                 |   |   |   |

| Test location: | Operator | Product-Assurance: | Date: | Time: |
|----------------|----------|--------------------|-------|-------|
|                |          |                    |       |       |
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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance                             | Actual<br>Value |   | Р | N |
|--------------|--|------------------|---------------------------------------|-----------------|---|---|---|
|              | Z010999MCVT005_IST_START_SSMM  |                  |                                       |                 | occurrence of 2 BSW                         |   |   |
|              | If Required the upload the OBCPs   |                  |                                       |                 | problems EvtID 30738 expected when starting |   |   |
| 40.          | Reply to the prompt: "OBCP UPLOADING"  | Confirm          |                                       |                 | OBCP Management for the 1st time.           |   |   |
|              | → Click the button "Confirm" to proceed  |                  |                                       |                 |   |   |   |
|              | Z010999MCVT005_IST_START_SSMM  |                  |                                       |                 | Must be performed if                        |   |   |
| 50.          | Reply to the prompt: "Definition of the Packet Store" Click the button "Confirm" to proceed        | 4                |                                       |                 | the Mass Memory is on                       |   |   |
| 60.          | If only 1 Bank (bank 0, 1, 2 or 3) is initialised on each SSMM D102159SCVT185_IST_PACKET_STORE_DEF |                  | <b>7</b>                              |                 |   |   |   |
|              | When the requested SSMM bank are initialised Click the button "Yes" to proceed                     |                  | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ |                 |   |   |   |
|              | Z010999MCVT005_IST_START_SSMM  |                  |                                       |                 |   |   |   |
| 80           | Reply to the prompt: "Initialise MTL Service Buffers"  |                  | $\sum_{i=1}^{n}$                      |                 |   |   |   |
|              | Click the button "Confirm" if required otherwise "Skip"  |                  |                                       |                 |   |   |   |
| 90           | D102159SCVT209_START_ON_BOARD_SCHEDULE   |                  |                                       |                 |   |   |   |
|              | Click the button "End TS!" to proceed  |                  |                                       |                 |   |   |   |

| Test location: | Operator | Product-Assurance: | Date: | Time: |
|----------------|----------|--------------------|-------|-------|
|                |          |                    |       |       |
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|     | D102159SCVT193_IST_UPLOAD_OBCP          |
|-----|---|
| 100 | → Click the button "End TS!" to proceed |
|     | Z010999MCVT005_IST_START_SSMM           |
| 110 | Click the button "End TS!" to proceed   |

| Test loc | ation. |          |                    |       |       |
|----------|--------|----------|--------------------|-------|-------|
| rest loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|          |        |          |                    |       |       |
|          |        |          |                    |       |       |
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7.6 **Perform Corresponding Procedure** 

| Step- | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value | Р  | N |
|-------|--|------------------|-----------|-----------------|----|---|
| 10.   | Perform corresponding procedure and then return here to switch off | ок               |           | OIC             | OK |   |

| Test location: | Operator | Product-Assurance: | Date:    | Time: |
|----------------|----------|--------------------|----------|-------|
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7.7 S/C Power OFF

7.7.1 CCU Power OFF

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р  | N |
|--------------|---|------------------|-----------|-----------------|----|---|
| 10.          | If the CCU has been switched on From "HPCCS Conductor Console" window select File -> Start -> Select ->  K102999ECVT001_ASDGENCCU_ABPWROF | ОК               |           | ØK.             | OK |   |

| Test location: | Operator | Product-Assurance: | Date:    | Time: |
|----------------|----------|--------------------|----------|-------|
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#### 7.7.2 SSMM Power OFF

| Step- | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value |  | Р | N |
|-------|---|------------------|-----------|-----------------|--|---|---|
|       | Verify the MTL is stopped by checking TM DEH26170   |                  |           |                 |  |   |   |
| 10    | If "Running" send the following TC  |                  |           |                 |  |   |   |
|       | DC91F170 : StopOnBoardSched   |                  |           |                 |  |   |   |
|       | Verify the OBCP is stopped by checking TM DEH36170  |                  |           |                 |  |   |   |
| 20    | If "Running" send the following TC  |                  |           |                 |  |   |   |
|       | DCN04170 : StopObcpManager  | (N)              |           |                 |  |   |   |
| 30    | If the SSMM has been switched on From "HPCCS Conductor Console" type the following to dump the Pkt stores | OK               |           |                 | Tm Rate can be increased to 1.5Mbps by sending DC27F170                          |   |   |
|       | D102159SCVT188_IST_DUMP_PKT_STORE 0 80 1 81 2 82 3 83 CEL_A CEL_B   |                  |           |                 | To save redundant packet stores (80, 81, 82, 83) can be omitted if not required. |   |   |

| Test location: | Operator | Product-Assurance; | Date: | Time: |
|----------------|----------|--------------------|-------|-------|
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| Step-<br>No. | Test-Step-Description  | Nominal<br>Value  | Tolerance | Actual<br>Value | Р | N |
|--------------|--|-------------------|-----------|-----------------|---|---|
| 40           | If the SSMM has been switched on From "HPCCS Conductor Console" window select File -> Start -> Select ->  D102159SCVT181_DISABLE_PKT_STORE | Continue          |           | value           |   |   |
| 50           | If the SSMM has been switched on From "HPCCS Conductor Console" window select File -> Start -> Select ->  D102159SCVT187_IST_SSMM_OFF      | Continue<br>EndTs |           |                 |   |   |

| T              |          |                    |       |       |
|----------------|----------|--------------------|-------|-------|
| Test location: | Operator | Product-Assurance: | Date: | Time: |
|                |          | (X) X)             |       |       |
|                |          | N N                |       |       |

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#### 7.7.3 CDMS & PCDU Power OFF

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value |      | Р  | N |
|--------------|--|------------------|-----------|-----------------|------|----|---|
|              | From "HPCCS Conductor Console" window select File -> Start -> Select ->  |                  |           |                 |      |    |   |
| 10           | Z010999MCVT002_POWER_OFF_HER_IST   | Pass             |           | Pers            |      | OK |   |
| 20           | D012159SCVT001_PM_SELECT  Click the button "End TS!" to proceed          | End TS           |           | ETS             |      | OK |   |
| 30           | Z010999MCVT001_POWER_ON_HER_IST  → Click the button "End TS!" to proceed | End TS           |           | ETS             | 9:46 | OK | - |

| Test location: |    | Operator | Product-Assurance: | Date:   | Time: |
|----------------|----|----------|--------------------|---------|-------|
| C :            | SE | 2,0ACECS | JH H               | 27-2-09 | 9:46  |

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#### 7.8 LBS/SAS SCOE nominal switch off => in Clean-room

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|---|------------------|-----------|-----------------|---|---|
|              | At the LBS/SAS SCOE PC (right)  |                  |           |                 |   |   |
| 10.          | Verify into the "H-P LPS SAS SCOE" main window the following fields: • SCOE State: LOCAL • SCOE activity: IDLE • S/C interface: ISOLATED                    | ОК               |           |                 |   |   |
| 20.          | Into the "H-P LPS SAS SCOE" main window select the menu option File → RackShutdownExit  | ок               |           |                 |   |   |
| 30.          | Into the "Logout confirmation" window select "Go OFFLINE/Isolate S/C" and click "Logout". Press Shutdown. (Note: This takes a while to complete, ca. 5 min) | ОК               |           |                 |   | · |
| 40.          | Verify the application is stopped.  | ок               |           |                 | 1 |   |
|              | At the LBS/SAS SCOE rack  |                  |           |                 |   |   |
| 50.          | After the monitor in the rack is switched off, switch off both the ELGAR controller PCs.  | ОК               |           |                 |   |   |
| 60.          | Shutdown and switch off the PC workstation.   | ОК               |           |                 | 1 |   |
| 70.          | Switch off the rack 3 (button at top of rack – also switches off rack 2)  | ок               |           |                 |   |   |
| 80.          | Switch off the rack 1 (the MITU), button at bottom left   | ОК               |           |                 | 1 |   |

| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|----------|--------|----------|--------------------|-------|-------|
|          |        |          |                    |       |       |

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#### 7.9 BS SCOE nominal switch off => in Clean-room

| Step-<br>No. | Test-Step-Description  | Nominal<br>Value | Tolerance | Actual<br>Value |    | Р | N |
|--------------|--|------------------|-----------|-----------------|----|---|---|
|              | At the BS SCOE PC (left)   |                  |           |                 |    |   |   |
| 10.          | Verify the BS SCOE is in OFFLINE mode.   | ОК               | ок        |                 | ×. |   |   |
| 20.          | Verify the BS SCOE is in LOCAL mode.   | ОК               |           |                 |    |   |   |
| 30.          | Stop the application, selecting the menu File → Exit, from the BS SCOE main window.  | ок               |           |                 |    |   |   |
| 40.          | On the popped up window "Log out confirmation" select the button "Go OFFLINE / Isolate S/C" and then click the "Log out" button. | Pass             |           |                 |    |   |   |
| 50.          | Verify the main window disappears.   | ОК               |           |                 |    |   |   |
| 60.          | Log off the system.  | ОК               |           |                 |    |   |   |
|              | At the BS SCOE rack  |                  |           |                 |    |   |   |
| 70.          | Switch off the BS rack by turning key at bottom left   | ок               |           |                 |    |   | - |

| Test lo | cation: | Operator | Product-Assurance: | Date: | Time: |
|---------|---------|----------|--------------------|-------|-------|
|         |         |          |                    |       |       |
|         |         |          |                    |       |       |

Doc. No:

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### Herschel

#### 7.10 TM/TC DFE nominal switch off

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|---|------------------|-----------|-----------------|---|---|
|              | At the TM/TC DFE PC   |                  |           |                 |   |   |
| 10.          | From the "System Status Window" → System Page → System State Box → Control Mode Verify that this label is set to 'Local'. If not, command it (password: H-P). | Local            |           |                 |   |   |
| 20.          | From the System Status Window → System Page → System State Box → Operation Mode Verify that this label is set to 'Offline'. If not, command it.               | Offline          |           |                 |   |   |
| 30.          | Stop the CMS application, from the menu File → Exit.  | Pass             |           | - 11 r.         |   |   |
| 40.          | The Exit System window appears.   | Pass             |           |                 |   |   |
| 50.          | Select Platform Shutdown, CMS Shutdown and click OK.  | Pass             |           |                 |   |   |
| 60.          | Shutdown the Workstation.   | Pass             |           |                 |   |   |
|              | At the TM/TC DFE rack   |                  |           |                 |   |   |
| 70.          | Switch off each unit of the TM/TC FE individually, in any order.  | Pass             |           |                 |   |   |

| Test loc | ation: | Operator | Product-Assurance: | Date: | Time: |
|----------|--------|----------|--------------------|-------|-------|
|          |        |          |                    |       |       |
|          |        |          |                    |       |       |
|          |        |          |                    |       |       |

Doc. No:

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Date: 17.02.09

File: HP-2-ASED-PR-0070\_5.doc



### Herschel

#### CCS HCI close, session stop and logoff 7.11

| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N |
|--------------|---|------------------|-----------|-----------------|---|---|
| 10.          | From the the "Session Manager Execution Window" REALTIME press the Leave button to disconnect from the running Test Session. Wait until into the Session fields RUN-NOT are displayed   | Pass             |           |                 |   |   |
| 20.          | From the "Session Manager Execution Window" REALTIME press the Stop button to stop the currently running Test Session. Verify that in the Realtime window into the Session fields NOT-NOT are displayed and into the System window the Status is NOT. | Pass             |           |                 |   |   |
| 30.          | From the "Session Manager Execution Window" REALTIME, select the menu button Execution → Close. Verify the window disappears.   | Pass             |           |                 |   |   |
| 40.          | From the "Session Manager System Window" HPCSS, select the menu button System → Quit Verify the window disappears.  | Pass             |           |                 |   |   |
| 50.          | Close all remaining HCI windows   | Pass             |           |                 |   |   |

| Test loc | cation: | Operator | Product-Assurance: | Date: | Time: |
|----------|---------|----------|--------------------|-------|-------|
|          |         |          |                    |       |       |
| L        |         |          |                    |       |       |

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| Step-<br>No. | Test-Step-Description   | Nominal<br>Value | Tolerance | Actual<br>Value | Р | N        |
|--------------|---|------------------|-----------|-----------------|---|----------|
| 60.          | Execute the System Logout from the KDE Start menu. Verify the Red Hat login window appears.   | Pass             |           |                 |   |          |
| 70.          | If not used anymore, switch off any other workstation (also in Cleanroom).                    | Pass             |           |                 |   |          |
| 80.          | Switch off all workstation screens  | Pass             |           |                 |   | <u> </u> |
| 90.          | Make an entry into the Logbook, that the S/C is powered off                                   | Pass             |           |                 |   |          |
| 100.         | Make a Printout of Script/Command History executed during the day and put it into the Logbook | Pass             |           |                 |   |          |

| Test location: | Operator | Product-Assurance: | Date: Ti | me: |  |  |  |  |
|----------------|----------|--------------------|----------|-----|--|--|--|--|
|                | '        |                    | 11       |     |  |  |  |  |
|                |          |                    |          | I   |  |  |  |  |
|                |          |                    |          | I   |  |  |  |  |
|                |          |                    |          | 1   |  |  |  |  |

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### Herschel

END OF DOCUMENT

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## Herschel

|   | Name                | Dep./Comp. |   | Name                                  | Dep./Comp. |
|---|---------------------|------------|---|---------------------------------------|------------|
|   | Baldock Richard     | FAE12      | Х | Sonn Nico                             | ASG51      |
|   | Barlage Bernhard    | AED13      |   | Steininger Eric                       | AED321     |
|   | Bayer Thomas        | ASA42      | Х | Stritter Rene                         | AED11      |
|   | Brune Holger        | ASA45      |   | Suess Rudi                            | OTN/ASA44  |
|   | Chen Bing           | HE Space   | Х | Theunissen Martijn                    | DSSA       |
|   | Davis William       | Captec     | Х | Vascotto Riccardo                     | HE Space   |
|   | Edelhoff Dirk       | AED21      |   | Wagner Klaus                          | ASG23      |
|   | Fehringer Alexander | ASG15      |   | Wietbrock Walter                      | AET12      |
| X | Fricke Wolfgang Dr. | AED 65     |   | Wöhler Hans                           | ASG23      |
|   | Geiger Hermann      | ASA42      |   | Wössner Ulrich                        | ASE252     |
|   | Grasl Andreas       | OTN/ASA44  |   | Zumstein Armin                        | AED15      |
|   | Grasshoff Brigitte  | AET12      |   |                                       |            |
| X | Hamer Simon         | Terma      |   |                                       |            |
|   | Hanka, Erhard       | FI522      |   |                                       |            |
| Х | Hendrikse Jeffrey   | HE Space   |   |                                       |            |
| - | Hendry David        | Terma      |   |                                       |            |
|   | Hengstler Reinhold  | ASA42      |   |                                       |            |
|   | Hinger Jürgen       | ASG23      |   |                                       |            |
| Х | Hohn Rüdiger        | AED65      |   |                                       |            |
| Χ | Hopfgarten Michael  | AET32      |   |                                       |            |
|   | Huber Johann        | ASA42      |   |                                       |            |
|   | Hund Walter         | ASE252     |   |                                       |            |
| Х | Idler Siegmund      | AED312     |   |                                       |            |
|   | Ivády von András    | FAE12      |   |                                       |            |
|   | Jahn Gerd Dr.       | ASG23      |   |                                       |            |
|   | Jolk Matthias       | AET1       | Х | ESA/ESTEC                             | ESA        |
|   | Klenke Uwe          | ASG72      | Х | Thales Alenia Space Cannes            | TAS-F      |
| Χ | Kölle Markus        | ASA43      | Х | Thales Alenia Space Torino            | TAS-I      |
|   | König Werner        | AET32      |   |                                       |            |
| Х | Koppe Axel          | AED312     |   |                                       |            |
| Χ | Kroeker Jürgen      | AED65      | 1 | Instruments:                          |            |
| Χ | La Gioia Valentina  | Terma      |   | MPE (PACS)                            | MPE        |
|   | Lang Jürgen         | ASE252     |   | RAL (SPIRE)                           | RAL        |
|   | Langenstein Rolf    | AED15      |   | SRON (HIFI)                           | SRON       |
|   | Langfermann Michael | ASA41      |   |                                       |            |
|   | Leitermann Stefan   | AET12      |   |                                       |            |
|   | Liberatore Danilo   | Rhea       |   | Subcontractors:                       |            |
|   | Martin Olivier      | Altec      |   | Austrian Aerospace                    | AAE        |
| Х | Maukisch Jan        | ASA43      |   | Austrian Aerospace                    | AAEM       |
| X | Much Christoph      | ASA43      |   | BOC Edwards                           | BOCE       |
| Х | Müller Martin       | ASA43      |   | Dutch Space Solar Arrays              | DSSA       |
|   | Pietroboni Karin    | AED65      |   | EADS Astrium Sub-Subsyst. & Equipment | ASSE       |
|   | Reichle Konrad      | ASA42      |   | EADS CASA Espacio                     | CASA       |
|   | Runge Axel          | OTN/ASA44  |   | EADS CASA Espacio                     | ECAS       |
|   | Saal Christoph      | External   |   | European Test Services                | ETS        |
| Χ | Schink Dietmar      | AED321     |   | Patria New Technologies Oy            | PANT       |
|   | Schmidt Thomas      | AED15      |   | SENER Ingenieria SA                   | SEN        |
|   | Schweickert Gunn    | ASG23      |   | Thales Alenia Space, Antwerp          | TAS-ETCA   |

Doc. No:

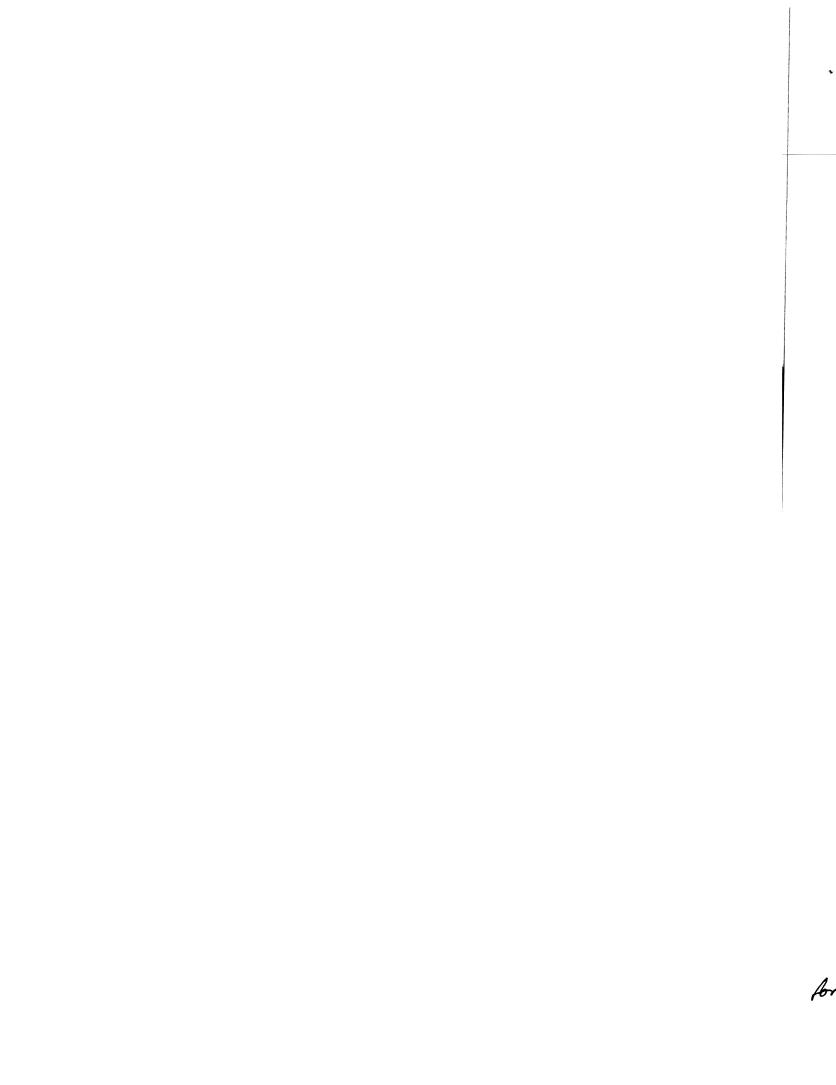
HP-2-ASED-PR-0070

Issue:

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Date: 17.02.09







#### **ACTIVITY SHEET**

HP-2-ASED-SD-047/

lss: 1

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| Location : | ESTEC        | e investigation on the |                        |                   |
|------------|--------------|------------------------|------------------------|-------------------|
| Facility:  | Class 100000 | Subsystem:             | Date: 26 February 2009 |                   |
|            |              | Test Conductor:        | I.Luck                 | NCR Ref: NCR-4913 |
| CI No      | 120000       | Prepared By:           | I.Luck                 | CIL No:           |

#### Scope:

This ACS details the actions to switch on the spacecraft with the BS SCOE alone and via manual operation of the BDR's in the SAS SCOE.

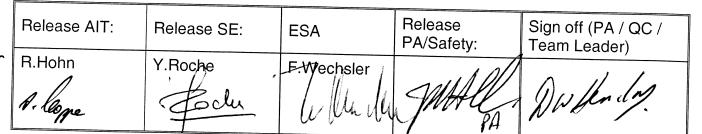
This ACS is only valid during the fault finding activities on the SAS SCOE in the S1B integration facility.

This procedure can only be used with a simple S/C switch-on using HP-2-ASED-PR-0070.

This ACS contains the following Annexes:

- Annex 1 : Procedure Variation Summary

| EGSE S/W               |  | On-Board S/W reference and Issue |  |
|------------------------|--|----------------------------------|--|
| As per leading proced  | ure  | As per leading procedure         |  |
| HPSDB:                 | Test Session ID:   |                                  |  |
| As per leading procedu | ıre  | As per leading procedure         |  |
| Facilities required:   | No specific facilities.  |                                  |  |
| Personnel required:    | <ul><li>1 Test conductor,</li><li>1 Functional Test engineer,</li><li>1 QA</li></ul> |                                  |  |
| Safety and Hazards:    | Not applicable.  |                                  |  |
| Constraints:           | Safety critical NCRs identified: None Blocking NCRs: None S/C configuration: None    |                                  |  |





### ACTIVITY SHEET

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| No:    | Activity  | Proc/Drg/Result | Responsible<br>& sign off |
|--------|---|-----------------|---------------------------|
| Spacec | raft Switch-on Activities   |                 |                           |
| 1      | Inform the Herschel floor manager of the start of activities of this ACS.   |                 | F.                        |
| 2      | Ensure the SAS SCOE controller is physically disconnected from the CCS-SCOE LAN.  | <b>✓</b>        |                           |
| 3      | Ensure the SAS SCOE rack 1 is powered and that the two round BDR connectors (SK01BX11 & SK01BX12) at connected at the rear of the SAS SCOE. | $\nu$           | A                         |
|        | Ensure the umbilical cables are connected to the Spacecraft via feed-through testboxes.   |                 | 0                         |
|        | In the test boxes the following pins should be strapped through the testboxes :   |                 |                           |
|        | - HU1J01 : pin 18 (Primary TC Data)   |                 |                           |
|        | - HU1J01 : pin 35 (Primary TC Data)   |                 |                           |
|        | - HU1J01 : pin 19 (Primary TC Clock)  |                 |                           |
|        | - HU1J01: pin 36 (Primary TC Clock)   |                 |                           |
|        | - HU1J01 : pin 17 (Primary TC Enable)   |                 |                           |
|        | - HU1J01 : pin 34 (Primary TC Enable)   |                 |                           |
|        | - HU1J01 : pin 31 (Primary TM Data)   | /               |                           |
|        | - HU1J01 : pin 52 (Primary TM Data)   | 1/              |                           |
| 4      | - HU1J01 : pin 32 (Primary TM Clock)  |                 |                           |
|        | - HU1J01 : pin 33 (Primary TM Clock)  |                 | <i>U</i>                  |
|        | - HU2J01 : pin 18 (Redundant TC Data)   |                 |                           |
|        | - HU2J01 : pin 35 (Redundant TC Data)   |                 |                           |
|        | - HU2J01 : pin 19 (Redundant TC Clock)  |                 |                           |
|        | - HU2J01 : pin 36 (Redundant TC Clock)  |                 |                           |
|        | - HU2J01 : pin 17 (Redundant TC Enable)   |                 |                           |
|        | - HU2J01 : pin 34 (Redundant TC Enable)   |                 |                           |
|        | - HU2J01 : pin 31 (Redundant TM Data)   |                 |                           |
|        | - HU2J01 : pin 52 (Redundant TM Data)   |                 |                           |
|        | - HU2J01 : pin 32 (Redundant TM Clock)  |                 |                           |
|        | - HU2J01 : pin 33 (Redundant TM Clock)  |                 |                           |

| Sign off (ACS implementing engineer) | Sign off (QA) |
|--------------------------------------|---------------|
|                                      | K. bossens R. |
|                                      |               |



HERSCHEL S/C

### ACTIVITY SHEET

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| No: | Activity  | Proc/Drg/Result  | Responsible<br>& sign off |
|-----|---|--|---------------------------|
|     | In the test boxes the following pins (for the separation straps) should be short-circuited on the Spacecraft side of the testboxes:  - HU1J01 pin 13 to HU1J01 pin 27  - HU1J01 pin 47 to HU1J01 pin 48  - HU1J01 pin 21 to HU1J01 pin 22  - HU1J01 pin 13 to HU1J01 pin 26  - HU2J01 pin 13 to HU1J01 pin 27  - HU2J01 pin 47 to HU1J01 pin 48  - HU2J01 pin 21 to HU1J01 pin 22  - HU2J01 pin 25 to HU1J01 pin 26 | A STATE OF THE STA | 4                         |
| 5   | When running the HP-2-ASED-PR-0070 procedure, section 7.5, configure the system (via the displayed GUI) for LPS Mode, simulated battery, battery voltage of 25.4V, nominal BDR case.  | V  | E                         |
| 6   | Ignore errors (continue) on the CCS workstation for TC/TM displayed to the SASSCOE until the error message is be displayed for the remote operation of BDR1 via SAS SCOE command. Then perform the following manual operation on the SAS SCOE before continuing   | 61   | A                         |
| 7   | At the front-panel of the SAS SCOE rack 1, on the unit Siemens CBI A110-1, push and hold the flip switch to manual (see left-hand arrow in the picture below) then push down the flip switch TX1 (see right-hand arrow in the picture below).  This action switches-on the BDR prime. (TX2 led should be OFF and TX1 led should be ON).   | PV   | A                         |

| Sign off (ACS implementing engineer) | Sign off (QA)  |
|--------------------------------------|----------------|
|                                      | R. Coossens R. |



HERSCHEL S/C

ACTIVITY SHEET

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| No:     | Activity  | Proc/Drg/Result | Responsible<br>& sign off |
|---------|---|-----------------|---------------------------|
| 8       | On the CCS workstation, select CONTINUE.  |                 |                           |
| 9       | On the CCS workstation, when the error message is be displayed for the remote operation of BDR2 via SAS SCOE command, perform the following manual operation on the SAS SCOE before continuing.   |                 |                           |
| 10      | At the front-panel of the SAS SCOE rack 1, on the unit Siemens CBI A110-2, push and hold the flip switch to manual (see left-hand arrow in the picture below) then push down the flip switch TX1 (see right-hand arrow in the picture below).  This action switches-on the BDR redundant. (TX2 led should be OFF and TX1 led should be ON). |                 |                           |
| 11      | Remove the two round BDR connectors (SK01BX11 & SK01BX12) from the rear of the SAS SCOE.  | V               | Ah.                       |
| 12      | On the CCS workstation, select CONTINUE.  | V               | 0 1/1                     |
| 13      | Continue with the spacecraft operation/testing.   | V               |                           |
|         |   |                 | <b>/</b>                  |
| Spaceci | aft Switch-off Activities   |                 |                           |
| 14      | When an error is displayed on the CCS workstation wrt the disconnection of the BDR1 via SAS SCOE command, then perform the following manual operations on the SAS SCOE before continuing  |                 | GRW -                     |
| 15      | Reconnect the two round BDR connectors (SK01BX11 & SK01BX12) to the rear of the SAS SCOE.   |                 | 62                        |
| 16      | At the front-panel of the SAS SCOE rack 1, on the unit Siemens CBI A110-1, push <b>and hold</b> the flip switch to <b>manual</b> (see left-hand arrow in the picture below) then push down the  | /               | ۵ پوس                     |

| Sign off (ACS implementing engineer) | Sign off (QA) |
|--------------------------------------|---------------|
|                                      |               |



HERSCHEL S/C

# ACTIVITY SHEET

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| No: | Activity  | Proc/Drg/Result | Responsible<br>& sign off |
|-----|---|-----------------|---------------------------|
|     | flip switch TX2 (see right-hand arrow in the picture below).  This action switches-off the BDR prime. (TX1 led should be  |                 | 6-30                      |
|     | OFF and TX2 led should be ON).  |                 | 4 20                      |
| 17  | On the CCS workstation, select <b>CONTINUE</b> .  | V               | G (%)                     |
| 18  | When an error is displayed on the CCS workstation wrt the disconnection of the BDR2 via SAS SCOE command, then perform the following manual operations on the SAS SCOE before continuing  |                 | 6-50                      |
| 19  | At the front-panel of the SAS SCOE rack 1, on the unit Siemens CBI A110-2, push and hold the flip switch to manual (see left-hand arrow in the picture below) then push down the flip switch TX2 (see right-hand arrow in the picture below). |                 | wD                        |

| Sign off (ACS implementing engineer) | Sign off (QA) |
|--------------------------------------|---------------|
|                                      |               |



## **ACTIVITY SHEET**

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| No:    | Activity   | Proc/Drg/Result | Responsible<br>& sign off |
|--------|--|-----------------|---------------------------|
|        | This action switches-off the BDR redundant. (TX1 led should be OFF and TX2 led should be ON).  | /               | 6-3E                      |
| 20     | On the CCS workstation, select <b>CONTINUE</b> .   | V               | CID                       |
| 21     | Continue with the spacecraft switch-off.   | v/              | WID.                      |
| Emerge | ncy Spacecraft Switch-off  |                 |                           |
| 22     | In case of an emergency the Spacecraft can be rapidly switched-off by operating the round, red EMERGENCY OFF button at the bottom right of the BS SCOE | NOT US          | ED                        |

| Sign off (ACS implementing engineer) | Sign off (QA) |
|--------------------------------------|---------------|
|                                      |               |
|                                      |               |



## ACTIVITY SHEET

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## Annex 1: Procedure Variation Summary

|  | Test Change |                   | Curr. No.:       | Curr. No.: |  |  |
|--|-------------|-------------------|------------------|------------|--|--|
|  |             |                   | Date             | Date       |  |  |
|  |             |                   | Page             | of         |  |  |
| Test designation                         |             | Test Procedure    | Issue            | Rev.       |  |  |
| Preliminary Electrical F with Flight ACU | Fit Check   | HP-2-ASED-SD-449  | 1                | B-draft    |  |  |
| Test step changed                        |             | Reason for Change |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
|  |             |                   |                  |            |  |  |
| repared by:                              | Resp.       | Test Leader       | Project Engineer |            |  |  |

| Sign off (ACS implementing engineer) | Sign off (QA) |
|--------------------------------------|---------------|
|                                      |               |
|                                      |               |







## 7 Appendix 4: SPIRE LPU Check at CSG As-Run Procedure

(ref. HP-2-ASED-SD-0469, issue 1)

Doc. No: HP-2-ASED-TR-0340

Issue:

| FADO A CI   | T                                  |                      |                                       |                             |                              |                     |         |
|---|------------------------------------|----------------------|---------------------------------------|-----------------------------|------------------------------|---------------------|---------|
| EADS Astrium<br>HERSCHEL S/C  | ACTIVITY                           | CTIVITY CONTROL SHEE |                                       | HP-2-ASED-SD-<br>Iss: 01    | HP-2-ASED-SD-0469<br>Iss: 01 |                     |         |
|   |                                    |                      | L.                                    |                             |                              |                     |         |
| Location: ESA   |                                    | OU Check at CSG      |                                       |                             |                              |                     |         |
| Facility: Class 100 000   | cility: Class 100 000   Model: PFM |                      |                                       |                             | Date: 2                      | 4/02/2009           |         |
| 0111  | Test Conductor:                    |                      | Subsysten RAL: D. G                   | riffin / S. Sidher          | NCR Ref                      |                     |         |
| Cl No.: 125 200   | Prepared By: A. Koppe/S. Hamer     |                      |                                       | CIL No:                     | I. IN//A                     |                     |         |
|   |                                    |                      |                                       |                             |                              |                     |         |
| Scope:  |                                    |                      | Proce                                 | dures and reference         | documents                    | :-                  |         |
| This following procedure shall represent the current drawn when the | 1                                  |                      | Ref.1:                                | SPIRE FM Short Fundiss. 2.5 | ctional Test I               | Procedures: SPIRE-R | AL-PRC- |
| Facilities required:  | EGSE: CCS<br>LL DVM                |                      |                                       | Drawings: none              |                              |                     |         |
| Personnel required:   | 1 CCS Operator;                    | ; 1 Test Conductor;  | 1 QA                                  | MASS:                       |                              |                     |         |
| Safety and Hazards:   | Cryostat harness connected to CCU  |                      |                                       |                             |                              |                     |         |
| Constraints:  | Class 100 000 cl                   | ean room             |                                       |                             |                              |                     |         |
| EGSE CCS SW version:  |                                    |                      | On-Boa                                | rd S/W·                     |                              |                     |         |
| 2.0-1817  |                                    |                      | · · · · · · · · · · · · · · · · · · · | SW: Version: 3 %.           | 0.1                          |                     |         |
| HPSDB: LI -(441   | ISS 28                             |                      | SPIRE                                 | SPIRE DPU ASW Version: ・る、ら |                              |                     |         |

| Release Floor Manager.  Release SPIRE Instrument / RAL: | Release AIT: 25/02/05                         | Release PA/Safety: | Sign off (PA/QC/Team Leader): |
|---|---|--------------------|-------------------------------|
|   | Release Floor Manager.<br>25. 02. 09 1, Legne |                    | 11. Cope                      |

| EADS Actuiture  |          |         |        |                     |             | 1 |
|-----------------|----------|---------|--------|---------------------|-------------|---|
| EADS Astrium    | ACTIVITY | CONTROL | 011555 | HP-2-ASED-SD-0469   |             |   |
| HERSCHEL S/C    | ACTIVITY | CONTROL | SHEET  | 111 -2-A0LD-0D-0409 |             |   |
| TILINSCITEL S/C |          |         |        | lss: 01             | Page 2 of 8 |   |
|                 |          |         |        |                     |             |   |

| No: | Activity   | Expected Value<br>Before/During/After | Actual Value | Success/Failure | Responsible         | e & sign off |
|-----|--|---------------------------------------|--------------|-----------------|---------------------|--------------|
| 01  | Verify that the SCOE cable connection according to Appendix 1 is in place, ensure that S/C configuration sheet (Appendix 2) is inline with test to be performed and inform Floor Manager that ACS will start | ОК                                    | V            |                 | She                 |              |
|     | LATCH VERIFICATION WITH DVM  |                                       |              |                 | S                   |              |
| 10  | Ensure that ESD rules are respected and wrist strap is attached by the operator  | ОК                                    | 0            |                 | So                  |              |
| 11  | Open MLI for access to CB 312300   | ОК                                    | Sest open    |                 | S                   |              |
| 12  | Disconnect J01 and J02 from P01 and P02 on CB 312300,  Integrate the connector of the 20 m long SPIRE test cable to the SVM-CB 312300 P01.   | ОК                                    | T &          |                 | S                   | <b>&gt;</b>  |
| 13  | Mate the 15 way adapter to the test cable, install the Break Out Box and connect the DVM between pins 3 and 10 \$.   | ОК                                    | i/ and       |                 | 3                   |              |
| 14  | Check on DVM that the resistance indicates that the Mechanism is latched   | ±40 525<br>(R = 173 ± 30 Ohm)         | 12 - 2 - 0   |                 | 25.02.6<br>Gust / 4 | 09<br>ans    |

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| No: | Activity   | Expected Value            | T            |                                 |                        |
|-----|--|---------------------------|--------------|---------------------------------|------------------------|
| NO. | -  | Before/During/After       | Actual Value | Success/Failure                 | Responsible & sign off |
|     | TEST EQUIPMENT REMOVAL   |                           |              |                                 |                        |
| 15  | Disconnect the SPIRE test cable from P01 on CB 312300  | ch                        | V St         |                                 | Be                     |
| 16  | Re-connect P/J01 and P/J02 on CB 312300  | OZ                        | V            |                                 | So                     |
| 17  | Closure of MLI as opened in step 02 above  |                           | lestopen de  |                                 | AZ => RVAG             |
|     | START OF SPIRE LPU CHECK   |                           | 1            |                                 |                        |
| 22  | If not already on configure EGSEs and switch ON SVM i.a.w. appendix 3 sections 7.1 – 7.5 (Ensuring PCDU-A is ON) | ОК                        | alreadyai    |                                 | Sh                     |
|     | Perform SPIRE Prime LPU check according to sections 4.1.24 and 4.2.24 of Ref1 as follows:                        |                           |              |                                 |                        |
| 23  | Power on Prime LPU LCL (LCL#25) Execute: DC25D170  | Status WM12B565<br>OFF/ON | ON           | State of LCL #25 switches to ON | Str                    |

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| No:  | Activity   | Expected Value  |              |                                  |                        |
|------|--|---|--------------|----------------------------------|------------------------|
| 110. |  | Before/During/After                                     | Actual Value | Success/Failure                  | Responsible & sign off |
| 24   | Send HL command #5 (LPU Enable Prime) Execute: DCT01170, DHT01170 = "CMD_ID_HLC5"                        | Monitor TM:<br><b>WM107565:</b><br>0 mA / / 130 -180 mA | €178 mA      | Current between 130 -180 mA      | Slo                    |
| 25   | Send HL command #6 (LPU Disable Prime) Execute: DCT01170, DHT01170 = "CMD_ID_HLC6"                       | Monitor TM:<br><b>WM107565:</b><br>130 -180 mA/ / 0 mA  | 0.01 m A     | Current OFF                      |                        |
| 26   | Un-Power LPU LCL (LCL#25) Execute: DC25B170  | Status WM12B565:<br>ON/OFF                              | CAF          | State of LCL #25 switches to OFF | \$                     |
| 27   | Power on Prime LPU LCL (LCL#26) Execute DC26D170   | Status WMA2B565:<br>OFF/ON                              | oN           | State of LCL #26 switches to ON  | S                      |
| 28   | Send HL command #21 (LPU Enable Prime) Execute: DCT01170, DHT01170 = "CMD_ID_HLC21"                      | Monitor TM:<br><b>WMA07565:</b><br>0 mA / / 130 -180 mA | 178 m A      | Current between 130 -180 mA      | Ser                    |
| 29   | Send HL command #22 (LPU Disable Prime) Execute: DCT01170, DHT01170 = "CMD_ID_HLC22"                     | Monitor TM:<br>WMA07565:<br>130 -180 mA/ / 0 mA         | OmA          | Current OFF                      | dr.                    |
| 30   | Un-Power LPU LCL (LCL#26)  Execute: DC26B170  by accidet DC27B170 was red, suited of LCL                 | Status WMA2B565:<br>ON/OFF<br>(2 -) No make             | OFF          | State of LCL #26 switches to OFF | Str                    |
| 31   | If no longer required switch off SVM and close the CCS test session i.a.w. appendix 3 section 7.7 – 7.11 | ок  | NJA          | Continue who                     | .F7                    |
| END  | Inform Floor Manager ACS complete  | ОК  | N/A          |                                  |                        |

### **APPENDIX 1**

## Actual SCOE cable connection (to be confirmed by AIT)

| SKIN-01 | PWR Panel (PCDU)                        |                |           |                              |                                |         |  |  |  |  |  |
|---------|---|----------------|-----------|------------------------------|--------------------------------|---------|--|--|--|--|--|
|         | Connector Function                      | Skin Connector | S/C unit  | SCOE CABLE                   | Flight Connector               | Checked |  |  |  |  |  |
|         | BS Nom Power                            | SK01BJ09       | PCDU      | BS SCOE Cable                |                                |         |  |  |  |  |  |
|         | DO HOITH OWE                            | 38016309       | PCDU      | Plugged<br>BS SCOE Cable     |                                | -       |  |  |  |  |  |
|         | BS Red Power                            | SK01BJ10       | PCDU      | Plugged                      |                                |         |  |  |  |  |  |
|         | BDR1 AIT                                | CKO4D I44      | Booti     | LPS SCOE                     |                                |         |  |  |  |  |  |
|         | BURTAIT                                 | SK01BJ11       | PCDU      | Cable Plugged<br>LPS SCOE    |                                | ļ       |  |  |  |  |  |
|         | BDR2 AIT                                | SK01BJ12       | PCDU      | Cable Plugged                |                                |         |  |  |  |  |  |
|         | CA Nom Dower                            | 01/04/104      |           | POWER SCOE                   |                                |         |  |  |  |  |  |
|         | SA Nom Power                            | SK01AJ01       | PCDU      | Cable Plugged                |                                |         |  |  |  |  |  |
|         | SA Nom Power                            | SK01AJ02       | PCDU      | POWER SCOE<br>Cable Plugged  |                                |         |  |  |  |  |  |
|         | _                                       |                |           | POWER SCOE                   |                                |         |  |  |  |  |  |
|         | SA Nom Power                            | SK01AJ03       | PCDU      | Cable Plugged                |                                |         |  |  |  |  |  |
|         | SA Nom Power                            | SK01AJ04       | Battery   | EMC Dust Cap                 |                                |         |  |  |  |  |  |
|         | SA Red Power                            | SK01AJ05       | PODU      | POWER SCOE<br>Cable Rlugged  |                                |         |  |  |  |  |  |
|         | -                                       | G1(01/1000     | NP        | POWER SCOE                   |                                |         |  |  |  |  |  |
|         | SA Red Power                            | SK01AJ06       | PCDU.)    | Cable Plugged                |                                |         |  |  |  |  |  |
|         | SA Red Power                            | SKQ1AJ07       | PCDU P    | POWER SCOE  Cable Plugged    |                                | ,       |  |  |  |  |  |
| KIN-02  | PWR Panel (ACC, CDMU, RCS, 15           | 53 & Thruster) |           | W 2                          |                                |         |  |  |  |  |  |
|         | Connector Function                      | Skin Connector | S/C unit  | SCOE CABLE                   | Flight Connector               |         |  |  |  |  |  |
| SKIN-02 | DMS 1553 Bus_A                          | J01            | CDMU/     | Bus Monitor<br>Cable Plugged |                                |         |  |  |  |  |  |
| SKIN-02 | DMS 1553 Bus_B                          | J02            | CDMU 7    | Bus Monitor<br>Cable Plugged | ×                              |         |  |  |  |  |  |
| SKIN-02 | ACMS 1553 Bus_A                         | 703            | ACC       | ACMS SCOE<br>Cable Plugged   | `                              | 7       |  |  |  |  |  |
|         |   |                |           | ACMS SCOE                    |                                |         |  |  |  |  |  |
| SKIN-02 | ACMS 1553 Bus_B                         | J04            | ACC       | Cable Rugged                 |                                |         |  |  |  |  |  |
| SKIN-02 | LV1/FCV 20N CMD S/A M                   | J05            | ACC/RCS   | ACMS SCOR<br>Cable Plugged   |                                |         |  |  |  |  |  |
|         |   |                | 71007100  | ACMS SCOE                    | 8                              |         |  |  |  |  |  |
| SKIN-02 | LV2/FCV 20N CMD S/A R                   | J06            | ACC/RCS   | Cable Plugged                | `                              |         |  |  |  |  |  |
| SKIN-02 | RCS Press/Tank Temp/PT Pwr              | J07            | ACC/PT&TH | ACMS SCOE<br>Cable Plugged   |                                |         |  |  |  |  |  |
| KIN-02  | Thruster Temp M/LV1 Sts                 | J08            | ACC/RCS   | ACM\$ SCOE<br>Cable Plugged  |                                |         |  |  |  |  |  |
|         | CDMU and ACC EEPROM                     |                |           | Justic Flaggod               | Flight Plug                    |         |  |  |  |  |  |
| SKIN-02 | reprogramming input CDMU and ACC EEPROM | J09            | ACC/CDMU  |                              | SK02P09 Plugged                |         |  |  |  |  |  |
| KIN-02  | reprogramming input                     | J10            | ACC/CDMU  |                              | Flight Plug<br>SK02P10 Plugged |         |  |  |  |  |  |
| KIN-02  | Thruster Temp R/LV2 Sts                 | J11            | ACC/RCS   | ACMS SCOE<br>Cable Plugged   | errezi ve riaggea              |         |  |  |  |  |  |
| KIN-02  | Thruster C/B Heaters M                  | J12            | ACC/CBH   | ACMS SCOE                    |                                |         |  |  |  |  |  |
| - 1     |   |                |           | Cable Plugged ACMS SCOE      |                                |         |  |  |  |  |  |
| KIN-02  | Thruster C/B Heaters R                  | J13            | ACC/CBH   | Cable Plugged                |                                |         |  |  |  |  |  |
|         | Str1/2 On/Off Cmd M/Str1 Sts            |                |           |                              | ACMS Flight Plug               |         |  |  |  |  |  |

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|--------------|----------|---------|--------|-------------------|-------------|
| HERSCHEL S/C | ACTIVITY | CONTROL | SHEET  | lss: 01           | Page 6 of 8 |

| SKIN-02            | Str1/2 On/Off Cmd R/Str2 Sts           | J15            | ACC/STR-2     |                                | ACMS Flight Plug<br>SK02P15 Plugged     |   |
|--------------------|--|----------------|---------------|--------------------------------|---|---|
| SKIN-02            | Gyro A On/Off Cmd                      | J16            | ACC/GYRO-E1   |                                | ACMS Flight Plug<br>SK02P16 Plugged     |   |
| SKIN-02            | Gyro B On/Off Cmd                      | J17            | ACC/GYRO-E2   |                                | ACMS Flight Plug                        |   |
| SKIN-03            | TTC Panel                              |                | 1100/01110 EZ |                                | SK02P17 Plugged                         | +   |
|                    | Connector Function                     | Skin Connector | S/C unit      | SCOE CABLE                     | Flight Connector                        |   |
| SKIN-03            | Test point TC + protection jumper EPC1 | SK03J01        | XPND1/EPC1    | OCCE CABLE                     | Flight cap                              |   |
| SKIN-03            | Test point TC + protection jumper EPC2 | SK03J02        | XPND2/EPC2    |                                | Flight cap                              |   |
|                    | RF LINK                                |                |               |                                |   |   |
|                    | Connector Function                     | Skin Connector | S/C unit      | SCOE CABLE                     | Flight Connector                        |   |
|                    | RF link for antenna LGA1               | N/A            | LGA1          | RF SCOE<br>LGA1 Plugged        | LGA1 Anechoic<br>Cap                    | A PROPERTY OF THE PROPERTY OF |
|                    | RF link for antenna LGA2               | N/A            | LGA2          | RF SCOE<br>LGA2 Plugged        | LGA2 Anechoic<br>Cap                    |   |
| 21/11/24           | RF link for antenna MGA                | N/A            | MGA           | RF SCOE<br>MGA Plugged         | MGA Anechoic Cap                        |   |
| SKIN-04            | ACMS Panel (RWE)                       |                |               |                                |   |   |
| SKIN-04            | Connector Function                     | Skin Connector | S/C unit      | SCOE CABLE                     | Flight Connector                        |   |
| SKIN-04            | RWL1 Sgn                               | J01            | ACC/RWL-1     |                                | ACMS Flight Plug<br>SK04P01 Plugged     |   |
| SKIN-04            | RWL2 Sgn                               | J02            | ACC/RWL-2     |                                | ACMS Flight Plug<br>SK04P02 Plugged     |   |
| SKIN-04            | RWL3 Sgn                               | J03            | ACC/RWL-3     |                                | ACMS Flight Plug<br>SK04P03 Plugged     |   |
|                    | RWL4 Sgn                               | J04            | ACC/RWL-4     |                                | ACMS Flight Plug<br>SK04P04 Plugged     |   |
| SKIN-05            | GYR/QRS Panel                          |                | -             |                                | - I I I I I I I I I I I I I I I I I I I |   |
|                    | Connector Function                     | Skin Connector | S/C unit      | SCOE CABLE                     | Flight Connector                        |   |
| SKIN-05            | CRS1 AOCS Sgn                          | J01            | CRS-1/ACC     |                                | ACMS Flight Plug                        |   |
| SKIN-05            | CRS2 AOCS Sgn                          | J02            | CRS-2/ACC     |                                | ACMS Flight Plug                        |   |
| SKIN-05            | GYRO RS422 / Test                      | J03            | GYRO          | ACMS SCOE<br>Cable Plugged     |   |   |
| SKIN-05            | CRS 1/2 Stimuli                        | J04            | CRS-1,2       | ACMS SCOE<br>Cable Plugged     |   |   |
| SKIN-05<br>SKIN-05 | AAD Sgn M                              | J05            | AAD/ACC       | ACMS SCOE<br>Cable Plugged     |   |   |
| SKIN-05            | SAS1/2 Sgn M                           | J06            | SAS/ACC       | ACMS SCOE                      |   |   |
| SKIN-05            | SAS1/2 Sgn R                           | J07            | SAS/ACC       | ACMS SCOE                      |   |   |
| SKIN-06            | AAD Sgn R<br>STR Panel                 | J08            | AAD/ACC       | ACMS SCOE<br>Cable Plugged     |   |   |
| 3KII4-00           |  | 01: 0          |               |                                |   |   |
|                    | Connector Function                     | Skin Connector | S/C unit      | SCOE CABLE                     | Flight Connector                        |   |
| SKIN-06            | STR1 Stimuli                           | J01            | STR1          | ACMS SCOE Cable Plugged        |   |   |
| SKIN-06            | STR2 Stimuli UMBILICAL                 | J02            | STR2          | ACMS SCOE<br>Cable Plugged     |   |   |
|                    | Connector Function                     | Connector      | S/C unit      | SCOE CABLE                     |   |   |
|                    | Power/Data                             | HU1J01         | SYSTEM        | SCOE CABLE SCOEs cable Plugged |   |   |
| -                  |  |                |               | SCOEs cable                    |   |   |

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### **APPENDIX 2**

S/C Operational Status Sheet

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#### **APPENDIX 3**

Parts that are relevant for this Activity Control Sheet:

RD1 HP-2-ASED-PR-0070 Iss 5







# 8 Appendix 5: SPIRE Spectrometer Switch ON Test – As-Run Procedure

(ref. HP-2-ASED-SD-0470, issue 1)

Doc. No: HP-2-ASED-TR-0340

Issue:

| EADS Astrium<br>HERSCHEL S/C                     | ACTIVITY                                  | CONTROL                          | SHEET              | HP-2-ASED-SD                 | -0470      | Page 1 of 3 |
|--|---|----------------------------------|--------------------|------------------------------|------------|-------------|
|  |   |                                  |                    |                              | ·          |             |
| Location : ESA                                   | Title: SPIRE Sp                           | ectrometer Switch o              | n Test (leaving SS | W Vss2 and Vdd2 swit         | ched off)  |             |
| Facility: Class 100 00                           | Model. Privi                              |                                  | Subsyster          | n: SPIRF                     | 25/02/2009 |             |
| OIN 405 000                                      | Test Conductor:                           |                                  | RAL: S. S          |                              | NCR Re     |             |
| CI No.: 125 200                                  | Prepared By: A.                           | Koppe                            |                    |                              | CIL No:    | 1. IV/A     |
|  |   |                                  |                    |                              | T OIL 140. |             |
| Scope:   |   |                                  | Proce              | edures and reference         | documents  |             |
| This following procedure of spectrometer JFET sw | shall be executed to itch on without JFET | verify PRIME side of 1 operation | pperation          |                              |            |             |
| Facilities required:                             | EGSE: CCS                                 |                                  |                    | Drawings: none               | •          |             |
| Personnel required:                              | 1 CCS Operator;                           | 1 Test Conductor;                | 1 QA               | MASS:                        | :          |             |
| Safety and Hazards:                              |   |                                  | )                  |                              |            |             |
| Constraints:                                     | Class 100 000 cle<br>EPLM mounted of      |                                  | ·                  |                              |            |             |
| EGSE CCS SW version:                             |   |                                  | On Poo             | rd S/W:                      |            |             |
|  | -1317                                     |                                  | CDMS /             | ASW: Version: 3.             | 8.0,       | ì           |
| 1PSDB: 41441 Ess 28                              |   |                                  | SPIRE              | SPIRE DPU ASW Version: 3.0.B |            |             |

| Release AIT:           |  |  |
|------------------------|--|--|
| 0                      | Release SE. To Mill Release PA/Safety: | Sign off (PA/QC/Team Leader):  |
| Release Floor Manager: | Release SPIRE Instrument / RAL:        | 1. Cappe   |
| 45                     |  | The state of the s |

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| No: | Activity  | Expected Value<br>Before/During/After                             | Actual Value | Success/Failure | Responsible & sign off |
|-----|---|---|--------------|-----------------|------------------------|
| 1   | Complete the Prime Side CFTs up to and including the Spectrometer Switch OFF procedure SPIRE-IST-COLD-SDET-OFF-P (section 7.2.2.29 in TP-0217 Issue 2). |   | OK.          | ok              | 05:59 27/a/09          |
| 2   | Wait for the I-EGSE to change mission configuration from fm_ist_cft_config19p_Kourou to fm_ist_cft_config20p_Kourou                                     |   | OK           | OK              | S                      |
| 3   | Run procedure SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P (as per section 7.2.2.25 in TP-0217)  | The SSW resistor channel SSW-R1 should not show any signal on QLA | OK           | OK              | Sie                    |
| 4   | Run procedure SPIRE-IST-COLD-SDET-OFF-P (section 7.2.2.29 in TP-0217 Issue 2).  |   | ok.          | OK              | S                      |
| 5   | Continue with the remaining switch-off sequence after Prime Side CFTs (from section 7.2.2.25 on wards in TP-0217)                                       |   | OK           | OK              | Sh                     |
| END | Inform Floor Manager ACS complete   | ОК  | 0 Z          | OK              | Sa                     |

27/01/09

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9 Appendix 6: Temperatures during CFT in He1

Doc. No: HP-2-ASED-TR-0340

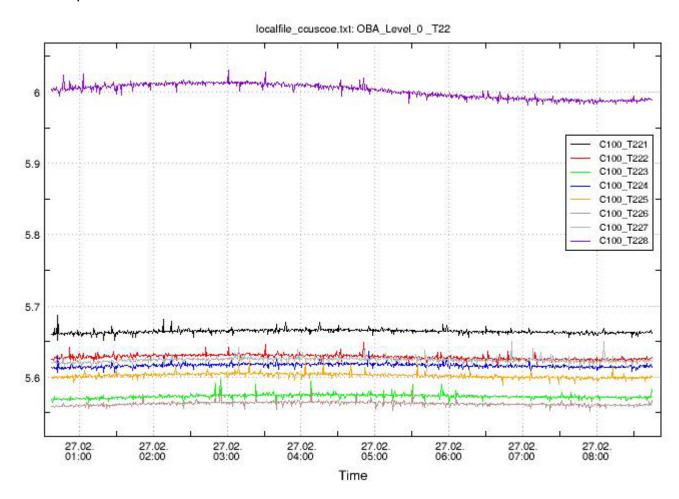
Issue:

Date: 04.03.09 File: HP-2-ASED-TR-0340\_1 SPIRE He1 CFT in Kourou.doc



### Herschel

#### Level 0 Temperatures



Doc. No: HP-2-ASED-TR-0340

Issue:

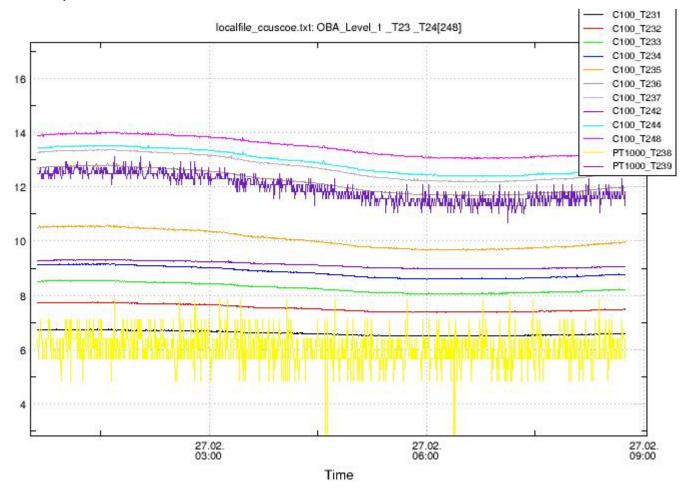
Date: 04.03.09

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Level 1 Temperatures



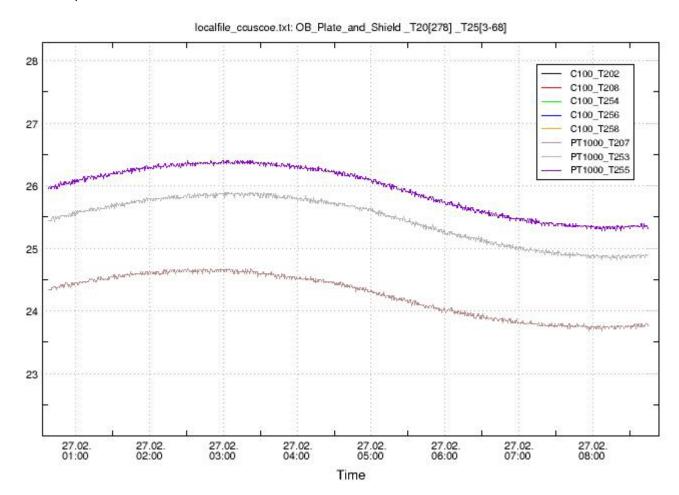
Doc. No: HP-2-ASED-TR-0340

Issue:



### Herschel

#### Level 2 Temperatures



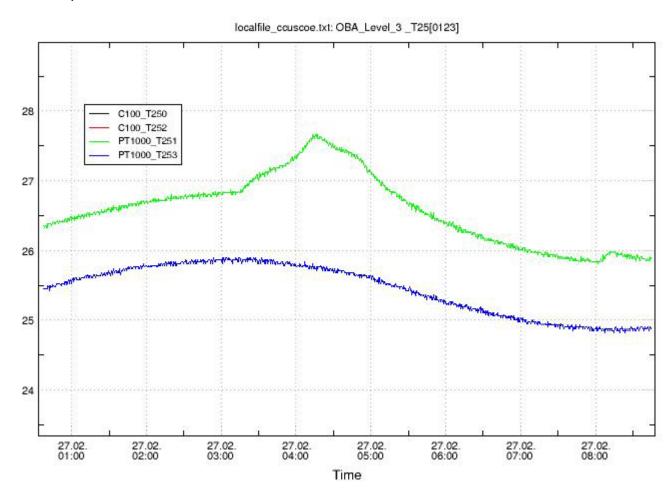
Doc. No: HP-2-ASED-TR-0340

Issue:



## Herschel

#### Level 3 Temperatures



Doc. No: HP-2-ASED-TR-0340

Issue:



## Herschel

END OF DOCUMENT

Doc. No: HP-2-ASED-TR-0340

Issue:



## Herschel

|          | Name                | Dep./Comp. |   | Name                                  | Dep./Comp. |
|----------|---------------------|------------|---|---------------------------------------|------------|
|          | Baldock Richard     | FAE12      |   | Theunissen Martijn                    | ASA43      |
|          | Barlage Bernhard    | AED13      |   | Vascotto Riccardo                     | HE Space   |
|          | Bayer Thomas        | ASA42      |   | Wagner Klaus                          | ASG23      |
|          | Brune Holger        | ASA45      | Х | Wietbrock Walter                      | AET12      |
|          | Chen Bing           | HE Space   |   | Wöhler Hans                           | ASG23      |
|          | Davis William       | Captec     |   | Wössner Ulrich                        | ASE252     |
|          | Edelhoff Dirk       | AED21      |   | Zumstein Armin                        | AED15      |
|          | Fehringer Alexander | ASG15      |   |                                       |            |
| Χ        | Fricke Wolfgang Dr. | AED 65     |   |                                       |            |
|          | Geiger Hermann      | ASA42      |   |                                       |            |
|          | Grasl Andreas       | OTN/ASA44  |   |                                       |            |
|          | Grasshoff Brigitte  | AET12      |   |                                       |            |
| Χ        | Hamer Simon         | Terma      |   |                                       |            |
|          | Hanka, Erhard       | FI522      |   |                                       |            |
|          | Hendrikse Jeffrey   | HE Space   |   |                                       |            |
|          | Hendry David        | Terma      |   |                                       |            |
|          | Hengstler Reinhold  | ASA42      |   |                                       |            |
|          | Hinger Jürgen       | ASG23      |   |                                       |            |
|          | Hofmann Rolf        | ASE252     |   |                                       |            |
| Х        | Hohn Rüdiger        | AED65      |   |                                       |            |
|          | Hopfgarten Michael  | AET32      |   |                                       |            |
|          | Huber Johann        | ASA42      |   |                                       |            |
|          | Hund Walter         | ASE252     |   |                                       |            |
|          | Idler Siegmund      | AED312     |   |                                       |            |
|          | Ivády von András    | FAE12      |   |                                       |            |
|          | Jahn Gerd Dr.       | ASG23      | Х | ESA/ESTEC                             | ESA        |
|          | Kölle Markus        | ASA43      | Х | Thales Alenia Space Cannes            | TAS-F      |
| Х        | Koppe Axel          | AED312     |   | Thales Alenia Space Torino            | TAS-I      |
| Х        | Kroeker Jürgen      | AED65      |   |                                       |            |
|          | Lang Jürgen         | ASE252     |   |                                       |            |
|          | Langenstein Rolf    | AED15      |   | Instruments:                          |            |
|          | Langfermann Michael | ASA41      |   | MPE (PACS)                            | MPE        |
|          | Liberatore Danilo   | Rhea       | Х | RAL (SPIRE)                           | RAL        |
|          | Martin Olivier      | Altec      |   | SRON (HIFI)                           | SRON       |
|          | Maukisch Jan        | ASA43      |   |                                       |            |
| Х        | Much Christoph      | ASA43      |   |                                       |            |
| Χ        | Müller Martin       | ASA43      |   | Subcontractors:                       |            |
|          | Pietroboni Karin    | AED65      |   | Austrian Aerospace                    | AAE        |
|          | Reichle Konrad      | ASA42      |   | Austrian Aerospace                    | AAEM       |
|          | Runge Axel          | OTN/ASA44  |   | BOC Edwards                           | BOCE       |
|          | Saal Christoph      | External   |   | Dutch Space Solar Arrays              | DSSA       |
|          | Schink Dietmar      | AED321     |   | EADS Astrium Sub-Subsyst. & Equipment | +          |
|          | Schmidt Thomas      | AED15      |   | EADS CASA Espacio                     | CASA       |
|          | Schweickert Gunn    | ASG23      |   | EADS CASA Espacio                     | ECAS       |
|          | Sonn Nico           | ASG51      |   | European Test Services                | ETS        |
|          | Steininger Eric     | AED321     |   | Patria New Technologies Oy            | PANT       |
| Χ        | Stritter Rene       | AED11      |   | SENER Ingenieria SA                   | SEN        |
| <u> </u> | Suess Rudi          | OTN/ASA44  |   | Thales Alenia Space, Antwerp          | TAS-ETCA   |

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