# 1. INTRODUCTION

This document describes the procedures to verify the correct functioning of all SPIRE FM subsystems at warm condition **before** instrument cool down. **Both PRIME and REDUNDANT instrument are to be tested within the sequence.** These procedures require the presence of the SPIRE personnel as the I-EGSE will be required to assess the results of part of test data.

## 1.1 Scope

This procedure has been designed for the checkout of the FM instrument.

## 1.2 Change Record

| Doc | # | Changes | Date of Change |
|---|---|---|---|
| Issue | 2.0 | Changes included to transform into FM version | 13/06/2006 |
| | 2.1 | - Rearranged Section 1.<br>- Inserted Section 2.1 to specify a general Pass/Fail Criterion.<br>- Removed Functional Test FUNC-BSM-06 as this functionality check is already covered by FUNC-BSM-5b<br>- Removed Functional Test FUNC-SMEC-04b as there is no extra functionality checked by this test that is not covered by the rest SMEC tests.<br>- Corrected typo in Section 1.7: (CFT instead of WFT)<br>- Corrected several typos/mismatches in Section 2:<br>o *Procedure 2.3.8* :  FUNC-SCU-07 voltages from EVHSV and SPHSV were swapped<br>   Minor updates in the steps of procedures.<br>o *Procedure 2.3.20*: Typo on BSM-05b for template to execute.<br>o *Procedure 2.3.34*: FUNC-DCU-03 frame count parameter value corrected<br>o *Procedure 2.3.35*: Typo on FUNC-DCU-11P | 16/08/2006 |
| | 2.2 | Several changes introduced for final version<br>• Included manual commanding for functional test FUNC-SMEC-01 | 02/01/2006 |
| | 2.3 | • Removed all references to AVM tests<br>• Removed all references to He I & He II conditions<br>• Changed test sequence to group SMEC Prime & Redundant tests together.<br>• Revised the duration of tests<br>• Updated the safe switch off sequence in case of an anomaly.<br>• Added the LPU test procedures | 5th Sept 2007 |

| | 2.4 | • Editorial changes following comments from Bernard Collaudin and the first WFT on 26th Sept 2007.<br>• Table of contents updated<br>• References to SCOS displays corrected for some procedures | 16th Oct 2007 |
|---|---|---|---|

## 1.3 Applicable Documents

| AD# | Title | Reference | Issue# | Date |
|---|---|---|---|---|
| AD01 | SPIRE Functional Test Specification | SPIRE-RAL-DOC-001652 | 1.4 | 22/07/2005 |
| AD02 | SPIRE ILT Warm Functional Test Procedure | SPIRE-RAL-PRC-002322 | 1.2 | 27/01/2006 |

## 1.4 Reference Documents

| RD# | Title | Reference | Issue# | Date |
|---|---|---|---|---|
| RD01 | SPIRE Instrument User Manual | SPIRE-RAL-PRJ-002395 | 1.1 | 10/04/2006 |

## 1.5 Open Issues

## 1.6 Duration

The estimated duration for executing the entire procedure, PRIME and REDUNDANT sequences, is approximately **8 hours.**

## 1.7 List of Acronyms

| | |
|---|---|
| **AND** | Alpha Numeric Display |
| **AVM** | Avionics Model |
| **BSM** | Beam Steering Mirror |
| **CCS** | Central Checkout System |
| **CDMU** | Command and Data Management Unit |
| **DCU** | Detector Control Unit |
| **DPU** | Digital Processing Unit |
| **DRCU** | Detector Readout and Control Unit |
| **EGSE** | Electrical Ground Support Equipment |
| **FM** | Flight Model |
| **FPU** | Focal Plane Unit |
| **I-EGSE** | Instrument EGSE |
| **IST** | Integrated Systems Test |
| **LCL** | Latch Current Limiter |
| **LIA** | Lock In Amplifier |
| **LPU** | Latch Power Unit (External) |
| **MCU** | Mechanism Control Unit |
| **MTL** | Mission Time Line |

| **OBT** | On Board Time |
|---|---|
| **OOL** | Out Of Limit |
| **RMS** | Reference Mission Scenario |
| **SMEC** | Spectrometer Mechanism |
| **VM** | Virtual Machine |

Spire Procedure

SPIRE FM Warm Functional Test
Procedures
A.A.Aramburu & Sunil D.Sidher

**Ref:** SPIRE-RAL-PRC-
2422
**Issue:** 2.4
**Date:** 16<sup>th</sup> October 2007
**Page:** 6 of 115

## 2. Test Configuration

The following sections describe the required hardware and I-EGSE configuration for the test.

## 2.1 FM Test Configuration

This is the required hw/sw configuration prior to the start of the test:

SPIRE WU:

- The SPIRE FM FPU should be interconnected through cryoharnesses to the SPIRE FM DRCU
- The SPIRE FM DRCU should be interconnected with the SPIRE FM DPU, both PRIME and REDUNDANT interfaces.
- The SPIRE FM DRCU PRIME and REDUNDANT power interfaces to the Herschel satellite should be connected.
- The SPIRE FM DPU PRIME and REDUNDANT 1553 interfaces to the Herschel satellite should be connected.
- The SPIRE FM DPU PRIME and REDUNDANT power interfaces to the Herschel satellite should be connected.

HCDMU:

- The Bus list selected on the HCDMU should be for SPIRE PRIME Instrument, (i.e., 27 TM slots allocated for SPIRE telemetry). For the PRIME side tests the BUS Configuration should be SPIRE Prime (i.e, RT=21) and for the REDUNDANT side test the BUS Configuration should be SPIRE Redundant (i.e, RT=22)
- The HCDMU and CCS should be interconnected.

CCS & I-EGSE:

- The CCS and the I-EGSE should be interconnected via the Pipe GW.
- The SPIRE MIB should be imported on the CCS.
- The CCSHandler application software should be running on the I-EGSE.
- I-EGSE system is up and running.(Database, SCOS , QLA, EGSE Router and Gateway, TM ingestion)

## 3. WARM FUNCTIONAL TEST PROCEDURES OVERVIEW

## 3.1 General instructions for executing test procedures

- Before carrying out the next procedure within the test sequence always ask for the go ahead by the SPIRE staff.
- Section 3.4 of this document specifies the sequence to be executed. Each of the steps in the sequence corresponds to procedures in sections 4.1 and 4.2.
- The procedure tables in section 4.1 and 4.2 include blank boxes where the actual values of parameters can be noted. Based on the comparison with the expected values the success or failure of a step should be recorded in the final column of the table.
- The last row in a procedure table should be used to record the overall Pass/Fail result of each test.
- Any text in boldface in the procedural steps generally indicates an action which may have to be performed manually by the CCS staff.

## 3.2  General Pass/Fail criterion

A test procedure can be declared as failed if there are two consecutive execution failures. If the repetition of the procedure is successful then it should be repeated once again as a 'health' check. **In case of overall failure see section 5** of the document which addresses the safe switch OFF of the instrument under different scenarios.

## 3.3  Constraints

- The SPIRE Warm Electronics need to be electrically integrated with the Herschel Satellite and the FPU needs to be integrated with SPIRE Warm Electronics.
- All tests which involve moving the Spectrometer Mechanism (SMECm) are highlighted yellow in section 3.4. These tests must be performed with the Herschel Cryostat horizontal and the SMEC unlatched.
- The test sequence in section 3.4 assumes that the Herschel cryostat is vertical initially and that the Prime side of the instrument will be tested first.
- The Herschel cryostat should not be tilted during the SMEC functional tests and while the SMEC is unlatched.
- **The duration of the tests will be significantly increased as a consequence of the unresolved NCR HP-130000-ASED-NC-3276 (Packet reception occurs in bursts and not at the rate generated by the instrument). It may not prove possible to analyse the test results in real time on the I-EGSE.**
- The converted TM parameter values are extracted from the MIB in use for PFM ILT. These values are subject to change for both prime and redundant operations.
- For these functional tests the instrument will not always be in a pre-defined mode as listed in the IUM (**RD04**). This does NOT compromise the instrument integrity.

## 3.4  Test Sequence

This section specifies the sequence to be executed with estimated times for each execution. The sequence assumes that the tests will be started on the Prime Side of the instrument with the Herschel Cryostat in the vertical configuration.

The functional tests which move the SMEC are highlighted yellow. **These tests, which include opening and closing the internal SMEC Launch Latch, should only be performed with the Herschel Cryostat horizontal.**

| Step # | Procedure Name | Purpose | Duration |
|---|---|---|---|
| 1. | SPIRE-FM-WFT-DPU-ON-P | DPU PRIME Power up and OBS start | 5 min |
| 2. | SPIRE-FM-WFT-DRCU-ON-P | DRCU PRIME Power up | 4 min |
| 3. | SPIRE-FM-WFT-FUNC-SCU-01-P | SCU Nominal Science Packet Generation Check PRIME | 3 min |
| 4. | SPIRE-FM-WFT-FUNC-SCU-03-P | SCU DC Thermometry Check PRIME | 8 min |
| 5. | SPIRE-FM-WFT-FUNC-SCU-06-P | SCU AC Thermometry Check PRIME | 2 min |
| 6. | SPIRE-FM-WFT-FUNC-SCU-02-P | SCU Nominal Science Contents Check PRIME | 5 min |
| 7. | SPIRE-FM-WFT-FUNC-SCU-04-P | Photometer Calibrator Check PRIME | 3 min |
| 8. | SPIRE-FM-WFT-FUNC-SCU-05-P | Spectrometer Calibrator Check PRIME | 5 min |
| 9. | SPIRE-FM-WFT-FUNC-SCU-07-P | Sorption Cooler Heaters Check PRIME | 5 min |

| Step # | Procedure Name | Purpose | Duration |
|---|---|---|---|
| 10. | SPIRE-FM-WFT-FUNC-SCU-08-P | SCU Test Pattern Check PRIME | 5 min |
| 11. | SPIRE-FM-WFT-FUNC-MCU-01-P | MCU Boot Check PRIME | 5 min |
| 12. | SPIRE-FM-WFT-FUNC-MCU-02-P | MCU Nominal Science Packet Generation Check PRIME | 5 min |
| 13. | SPIRE-FM-WFT-FUNC-MCU-03-P | MCU Nominal Science Contents Check PRIME | 5 min |
| 14. | SPIRE-FM-WFT-FUNC-MCU-04-P | MCU Test Pattern Check PRIME | 5 min |
| 15. | SPIRE-FM-WFT-FUNC-BSM-01-P | BSM Chop/Jiggle Sensors Check PRIME | 5 min |
| 16. | SPIRE-FM-WFT-FUNC-BSM-02C-P | BSM Chop Sensor Polarity Check PRIME | 5 min |
| 17. | SPIRE-FM-WFT-FUNC-BSM-02J-P | BSM Jiggle Sensor Polarity Check PRIME | 5 min |
| 18. | SPIRE-FM-WFT-FUNC-BSM-03-P | BSM Open Loop Dynamics Check PRIME | 5 min |
| 19. | SPIRE-FM-WFT-FUNC-BSM-05A-P | BSM Open Loop Chop Test PRIME | 5 min |
| 20. | SPIRE-FM-WFT-FUNC-BSM-05B-P | BSM Close Loop Chop Test PRIME | 5 min |
| 21. | SPIRE-FM-WFT-FUNC-BSM-06-P | BSM Operational Mode Check PRIME | 5 min |
| 22. | SPIRE-FM-WFT-BSM-0FF-P | BSM Switch OFF PRIME | 3 min |
| 23. | SPIRE-FM-WFT-FUNC-DCU-01-P | DCU Nominal Science Packet Generation Check PRIME | 5 min |
| 24. | SPIRE-FM-WFT-FUNC-DCU-02-P | DCU High Speed Link Check PRIME | 5 min |
| 25. | SPIRE-FM-WFT-FUNC-DCU-03-P | DCU Test pattern Check PRIME | 5 min |
| 26. | SPIRE-FM-WFT-FUNC-DCU-04-PHOT-P | Photometer LIAs Check PRIME | 5 min |
| 27. | SPIRE-FM-WFT-FUNC-DCU-11-PHOT-P | Photometer BDAs Switch ON Check PRIME | 5 min |
| 28. | SPIRE-FM-WFT-FUNC-DCU-13-PHOT-P | Photometer BDAs Integrity Check PRIME | 15 min |
| 29. | SPIRE-FM-WFT-FUNC-DCU-14-PHOT-P | Photometer BDAs Noise Check PRIME | 5 min |
| 30. | SPIRE-FM-WFT-PDET-OFF-P | Photometer BDAs Switch OFF PRIME | 3 min |
| 31. | SPIRE-FM-WFT-FUNC-DCU-04-SPEC-P | Spectrometer LIAs Check PRIME | 5 min |
| 32. | SPIRE-FM-WFT-FUNC-DCU-11-SPEC-P | Spectrometer BDAs Integrity Check PRIME | 5 min |
| 33. | SPIRE-FM-WFT-FUNC-DCU-13-SPEC-P | Spectrometer BDAs Integrity Check PRIME | 12 min |
| 34. | SPIRE-FM-WFT-FUNC-DCU-14-SPEC-P | Spectrometer BDAs Noise Check PRIME | 5 min |
| 35. | SPIRE-FM-WFT-SDET-OFF-P | Spectrometer BDAs Switch OFF PRIME | 3 min |
| 36. | SPIRE-FM-WFT-MCU-OFF-P | MCU Switch OFF PRIME | 2 min |
| 37. | SPIRE-FM-WFT-SCU-OFF-P | SCU Switch OFF PRIME | 2 min |
| 38. | SPIRE-FM-WFT-DRCU-OFF-P | DRCU Power OFF PRIME | 5 min |
| 39. | SPIRE-FM-WFT-DPU-OFF-P | DPU Power OFF PRIME | 5 min |
| 40. | **The Herschel cryostat has to be tilted horizontal for the following** | | **To be specified by** |

| Step # | Procedure Name | Purpose | Duration |
|---|---|---|---|
| | **SMEC tests** | | **industry** |
| 41. | SPIRE-FM-WFT-DPU-ON-P | DPU PRIME Power up and OBS start | 5 min |
| 42. | SPIRE-FM-WFT-DRCU-ON-P | DRCU PRIME Power up | 5 min |
| 43. | SPIRE-FM-WFT-FUNC-MCU-01-P | MCU Boot Check PRIME | 5 min |
| 44. | SPIRE-FM-WFT-FUNC-SMEC-01-P | SMEC Encoder and LVDT check PRIME | 5 min |
| 45. | SPIRE-FM-WFT-FUNC-SMEC-03-P | SMEC Encoder Levels Check PRIME | 5 min |
| 46. | SPIRE-FM-WFT-FUNC-SMEC-02A-P | SMEC Open Launch Latch PRIME | 5 min |
| 47. | SPIRE-FM-WFT-FUNC-SMEC-04A-P | SMEC Open Loop Position check PRIME | 5 min |
| 48. | SPIRE-FM-WFT-FUNC-SMEC-09-P | SMEC Open Loop Scan check PRIME | 5 min |
| 49. | SPIRE-FM-WFT-FUNC-SMEC-07-P | SMEC Closed Loop Scan check PRIME | 5 min |
| 50. | SPIRE-FM-WFT-FUNC-SMEC-02B-P | SMEC Close Launch Latch PRIME | 5 min |
| 51. | SPIRE-FM-WFT-SMEC-OFF-P | SMEC Switch OFF PRIME | 3 min |
| 52. | SPIRE-FM-WFT-MCU-OFF-P | MCU Switch OFF PRIME | 2 min |
| 53. | SPIRE-FM-WFT-SCU-OFF-P | SCU Switch OFF PRIME | 2 min |
| 54. | SPIRE-FM-WFT-DRCU-OFF-P | DRCU Power OFF PRIME | 5 min |
| 55. | SPIRE-FM-WFT-DPU-OFF-P | DPU Power OFF PRIME | 5 min |
| 56. | SPIRE-FM-WFT-LPU-01-P | Checkout of LPU PRIME | 5 min |
| 57. | **Change to SPIRE Redundant MIB on the CCS (If required)** | | 5 min |
| 58. | **Change to SPIRE Redundant MIB on the I-EGSE (If required)** | | ~5-10 min |
| 59. | **Configure 1553 Spacecraft bus from SPIRE DPU PRIME to SPIRE DPU REDUNDANT.** | | 5 min |
| 60. | SPIRE-FM-WFT-DPU-ON-R | DPU REDUNDANT Power up and OBS start | 5 min |
| 61. | SPIRE-FM-WFT-DRCU-ON-R | DRCU REDUNDANT Power up | 4 min |
| 62. | SPIRE-FM-WFT-FUNC-MCU-01-R | MCU Boot Check REDUN. | 5 min |
| 63. | SPIRE-FM-WFT-FUNC-SMEC-01-R | SMEC Encoder and LVDT Check REDUN. | 5 min |
| 64. | SPIRE-FM-WFT-FUNC-SMEC-03-R | SMEC Encoder Levels Check REDUN. | 5 min |
| 65. | SPIRE-FM-WFT-FUNC-SMEC-02A-R | SMEC Open Launch Latch REDUN. | 5 min |
| 66. | SPIRE-FM-WFT-FUNC-SMEC-04A-R | SMEC Open Loop Position Check REDUN. | 5 min |
| 67. | SPIRE-FM-WFT-FUNC-SMEC-09-R | SMEC Open Loop Scan Check REDUN. | 5 min |
| 68. | SPIRE-FM-WFT-FUNC-SMEC-07-R | SMEC Closed Loop Scan Check REDUN. | 5 min |
| 69. | SPIRE-FM-WFT-FUNC-SMEC-02B-R | SMEC Close Launch Latch REDUN. | 5 min |
| 70. | SPIRE-FM-WFT-SMEC-OFF-R | SMEC Switch OFF REDUN. | 3 min |
| 71. | SPIRE-FM-WFT-MCU-OFF-R | MCU Switch OFF REDUN. | 2 min |
| 72. | SPIRE-FM-WFT-DRCU-OFF-R | DRCU Power OFF REDUN. | 5 min |

| Step # | Procedure Name | Purpose | Duration |
|---|---|---|---|
| 73. | SPIRE-FM-WFT-DPU-OFF-R | DPU Power OFF REDUN. | 5 min |
| 74. | **The Herschel cryostat should now be tilted back to vertical for the remainder of WFTs** | | **To be specified by industry** |
| 75. | SPIRE-FM-WFT-DPU-ON-R | DPU REDUNDANT Power up and OBS start | 5 min |
| 76. | SPIRE-FM-WFT-DRCU-ON-R | DRCU REDUNDANT Power up | 4 min |
| 77. | SPIRE-FM-WFT-FUNC-SCU-01-R | SCU Nominal Science Packet Generation Check REDUN. | 3 min |
| 78. | SPIRE-FM-WFT-FUNC-SCU-03-R | SCU DC Thermometry Check REDUN. | 8 min |
| 79. | SPIRE-FM-WFT-FUNC-SCU-06-R | SCU AC Thermometry Check REDUN. | 2 min |
| 80. | SPIRE-FM-WFT-FUNC-SCU-02-R | SCU Nominal Science Contents Check REDUN. | 5 min |
| 81. | SPIRE-FM-WFT-FUNC-SCU-04-R | Photometer Calibrator Check REDUN. | 3 min |
| 82. | SPIRE-FM-WFT-FUNC-SCU-05-R | Spectrometer Calibrator Check REDUN. | 5 min |
| 83. | SPIRE-FM-WFT-FUNC-SCU-07-R | Sorption Cooler Heaters Check REDUN. | 5 min |
| 84. | SPIRE-FM-WFT-FUNC-SCU-08-R | SCU Test Pattern Check REDUN. | 5 min |
| 85. | SPIRE-FM-WFT-FUNC-MCU-01-R | MCU Boot Check REDUN. | 5 min |
| 86. | SPIRE-FM-WFT-FUNC-MCU-02-R | MCU Nominal Science Packet Generation Check REDUN. | 5 min |
| 87. | SPIRE-FM-WFT-FUNC-MCU-03-R | MCU Nominal Science Contents Check REDUN. | 5 min |
| 88. | SPIRE-FM-WFT-FUNC-MCU-04-R | MCU Test Pattern Check REDUN | 5 min |
| 89. | SPIRE-FM-WFT-FUNC-BSM-01-R | BSM Chop/Jiggle Sensors Check REDUN. | 5 min |
| 90. | SPIRE-FM-WFT-FUNC-BSM-02c-R | BSM Chop Sensor Polarity Check REDUN. | 5 min |
| 91. | SPIRE-FM-WFT-FUNC-BSM-02j-R | BSM Jiggle Sensor Polarity Check REDUN. | 5 min |
| 92. | SPIRE-FM-WFT-FUNC-BSM-03-R | BSM Open Loop Dynamics Check REDUN. | 5 min |
| 93. | SPIRE-FM-WFT-FUNC-BSM-05A-R | BSM Open Loop Chop Test REDUN. | 5 min |
| 94. | SPIRE-FM-WFT-FUNC-BSM-05B-R | BSM Closed Loop Chop Test REDUN. | 5 min |
| 95. | SPIRE-FM-WFT-FUNC-BSM-06-R | BSM Operational Mode Check REDUN | 5 min |
| 96. | SPIRE-FM-WFT-BSM-0FF-R | BSM Switch OFF REDUN. | 5 min |
| 97. | SPIRE-FM-WFT-FUNC-SMEC-03-R | SMEC Encoder Levels Check REDUN. | 5 min |
| 98. | SPIRE-FM-WFT-FUNC-SMEC-01-R | SMEC Encoder and LVDT Check REDUN. | 5 min |
| 99. | SPIRE-FM-WFT-FUNC-DCU-01-R | DCU Nominal Science Packet Generation Check REDUN. | 5 min |
| 100. | SPIRE-FM-WFT-FUNC-DCU-02-R | DCU High Speed Link Check REDUN. | 5 min |
| 101. | SPIRE-FM-WFT-FUNC-DCU-03-R | DCU Test pattern Check REDUN. | 5 min |
| 102. | SPIRE-FM-WFT-FUNC-DCU-04-PHOT-R | Photometer LIAs Check REDUN. | 5 min |
| 103. | SPIRE-FM-WFT-FUNC-DCU-11- | Photometer BDAs Switch ON Check | 5 min |

| Step # | Procedure Name | Purpose | Duration |
|---|---|---|---|
| | PHOT-R | REDUN. | |
| 104. | SPIRE-FM-WFT-FUNC-DCU-13-PHOT-R | Photometer BDAs Integrity Check REDUN. | 15 min |
| 105. | SPIRE-FM-WFT-FUNC-DCU-14-PHOT-R | Photometer BDAs Noise Check REDUN. | 5 min |
| 106. | SPIRE-FM-WFT-PDET-OFF-R | Photometer BDAs Switch OFF REDUN. | 3 min |
| 107. | SPIRE-FM-WFT-FUNC-DCU-04-SPEC-R | Spectrometer LIAs Check REDUN. | 5 min |
| 108. | SPIRE-FM-WFT-FUNC-DCU-11-SPEC-R | Spectrometer BDAs Integrity Check REDUN. | 5 min |
| 109. | SPIRE-FM-WFT-FUNC-DCU-13-SPEC-R | Spectrometer BDAs Integrity Check REDUN. | 12 min |
| 110. | SPIRE-FM-WFT-FUNC-DCU-14-SPEC-R | Spectrometer BDAs Noise Check REDUN. | 5 min |
| 111. | SPIRE-FM-WFT-SDET-OFF-R | Spectrometer BDAs switch OFF REDUN. | 3 min |
| 112. | SPIRE-FM-WFT-MCU-OFF-R | MCU Switch OFF REDUN. | 2 min |
| 113. | SPIRE-FM-WFT-SCU-OFF-R | SCU Switch OFF REDUN. | 2 min |
| 114. | SPIRE-FM-WFT-DRCU-OFF-R | DRCU Power OFF REDUN. | 5 min |
| 115. | SPIRE-FM-WFT-DPU-OFF-R | DPU Power OFF REDUN. | 5 min |
| 116. | SPIRE-FM-WFT-LPU-01-R | Checkout of LPU REDUN | 5 min |
| | | **Total Duration** | **~ 9-10 hrs plus times needed to tilt the cryostat horizontal and back to vertical.** |

# 4. DETAILED WARM FUNCTIONAL TEST PROCEDURES

## 4.1 PRIME Instrument

### 4.1.1 Procedure SPIRE-FM-WFT-DPU-ON-P

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | To switch on the SPIRE DPU PRIME and start generating housekeeping |
| **Initial configuration** | SPIRE DPU and DRCU PRIME are switched off |
| **Final configuration** | SPIRE DPU PRIME is ON and SPIRE HK is being produced , SPIRE DRCU PRIME is OFF |
| **Preconditions** | • SPIRE FM DPU is electrically integrated with the Herschel Satellite<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/After | Actual Values Before/After | Pass/ Fail |
|---|---|---|---|---|---|
| 1 | Select DPU AND OBS PARAMETERS display is on the CCS | — | — | — | |
| 2 | **Power ON the SPIRE DPU PRIME unit using the dedicated spacecraft LCL line and configure 1553 Spacecraft bus for SPIRE DPU PRIME (RT = 21)** | — | — | — | |
| 3 | Wait for the boot software to produce at least 2 event packets (5,1) | | | | |
| 4 | Execute TCL script SPIRE-FM-WFT-DPU-START-P-SP.tcl | — | — | — | |
| 5 | Check that Nominal and Critical HK packets are arriving at the CCS: **SPIRE Nominal HK:** • (type ,subtype) : (3,25) • APID : 0x502 **SPIRE Critical HK:** • (type ,subtype) : (3,25) • APID: 0x500 | | | | |
| 6 | Check that THSK parameter is refreshing every second | THSK | Refreshing @ 1 Hz | — | |
| 7 | Check that TM2N parameter is incrementing by 1 every second | TM2N | Incrementing by 1 @ 1Hz | — | |
| 8 | Check that TM1N parameter is incrementing by 1 every 2 second | TM1N | Incrementing by 1 @ 0.5Hz | | |
| 9 | **On CCS check the consistency of the SPIRE on board time to the HCDMU time and the CCS.** * | — | — | | |
| 10 | On I-EGSE check the consistency between SCOS time and THSK and QLA time. | THSK | Incrementing once per second | | |
| **Test Result (Pass/Fail):** | | | | | |

* Assuming that OBT is provided by the HCDMU following RD02, i.e, OBT is TAI, there should be a 33 second difference between OBS and CCS time (assuming CCS is using UTC). In the case the HCDMU is using UTC to specify the on board time, there should be no difference between THSK and the CCS/I-EGSE system time.

### 4.1.2 Procedure SPIRE-FM-WFT-DRCU-ON-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | To switch on the SPIRE DRCU PRIME and start generating housekeeping |
| **Initial configuration** | SPIRE DPU PRIME is ON and DRCU PRIME is switched OFF |
| **Final configuration** | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced |
| **Preconditions** | • SPIRE FM DRCU is electrically integrated with the Herschel Satellite<br>• SPIRE DRCU is switched OFF<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 4 minutes |
| **Pass/Fail Criteria** | DRCU voltages show expected 'ON' values |

**Procedure steps:**

| Step | Description | Parameter - Unit | Expected Values Before/After | Actual Values Before/After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-DRCU-START-P-STEP1.tcl | — | — | — | |
| 2 | Check that THSK parameter is not refreshing anymore | THSK | Not refreshing | — | |
| 3 | Check that TM2N parameter is not incrementing anymore | TM2N | Not incrementing | — | |
| 4 | **Power ON the SPIRE DRCU PRIME unit using the dedicated spacecraft LCL line.** | — | — | — | |
| 5 | Execute TCL script SPIRE-FM-WFT-DRCU-START-P-STEP2.tcl | — | — | — | |
| 6 | Check that THSK parameter is again refreshing every second | THSK | Refreshing @ 1Hz | | |
| 7 | Check that TM2N parameter is again incrementing every second | TM2N | Incrementing by 1 @ 1Hz | — | |
| 8 | Check that the SCU/DCU voltages show nominal values | SCUP5V - V<br>SCUP9V - V<br>SCUM9V - V<br>BIASP5V - V<br>BIASP9V - V<br>BIASM9V - V | ~ $5.2 \pm 0.5$<br>~ $9.0 \pm 0.2$<br>~ $-9.0 \pm 0.2$<br>~ $5.1 \pm 0.5$<br>~ $9.0 \pm 0.2$<br>~ $-9.0 \pm 0.2$ | — | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.3 Procedure SPIRE-FM-WFT-FUNC-SCU-01-P

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SCU science packet generation check |
| **Initial configuration** | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| **Duration** | 3 minutes |
| **Pass/Fail Criteria** | Specified SCU HK parameters show expected increment. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-01-P.tcl | SCUFRAMECNT TM5N | 0/31 0x3FFF/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.4 Procedure SPIRE-FM-WFT-FUNC-SCU-03-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• SFT PARAMETERS display is selected on the CCS |
| **Duration** | 8 minutes |
| **Pass/Fail Criteria** | DC Thermometry channels show temperature readings according to the actual instrument temperature*<br>*: At warm temperatures all channels should show short circuit RAW readings of -32768 |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-03-P.tcl | — | — | — | — |
| 2 | **Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm** | | | | |
| 3 | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT | 0/0xFFFF/0xFFFF | | |
| 4 | **Configure the SFT PARAMETERS display to show the RAW values of SCU DC thermometry channels.**<br><br>Record the values of SCU DC thermometry channels. Nominal values should show a short circuit status (or RAW -32768)<br><br>**Non Nominal (Open Circuit Criterion): RAW reading in the range [0, -100]** | PUMPHTRTEMP<br>PUMPHSTEMP<br>EVAPHSTEMP<br>SHUNTTEMP<br>EMCFILTEMP<br>SL0TEMP<br>PL0TEMP<br>OPTTEMP<br>BAFTEMP<br>BSMIFTEMP<br>SCAL2TEMP<br>SCAL4TEMP<br>SCALTEMP<br>SMECIFTEMP<br>SMECTEMP<br>BSMTEMP | —<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>— | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.5 Procedure SPIRE-FM-WFT-FUNC-SCU-06-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• SFT PARAMETERS display is selected on the CCS |
| **Duration** | 2 minutes |
| **Pass/Fail Criteria** | AC Thermometry channel shows 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-06-P.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 | **Configure the SFT PARAMETERS display to show the RAW values of SCU AC thermometry channel.**<br><br>Record the value of SCU AC thermometry channel.<br><br>Nominal value should show a short circuit status (or RAW ~ -32768)<br>**Non Nominal (Open Circuit Criterion): RAW reading in the range [0, -100]** | SUBKTEMP | — | | |

| **Test Result (Pass/Fail):** |
|---|

### 4.1.6 Procedure SPIRE-FM-WFT-FUNC-SCU-02-P

| | |
| --- | --- |
| Version | 2.4 |
| Date | 16th Oct. 2007 |
| Purpose | SCU Nominal Science Contents Check |
| Initial configuration | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced |
| Final configuration | Unchanged |
| Preconditions | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| Duration | 5 minutes |
| Pass/Fail Criteria | Specified SCU HK parameters show expected increment. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-02-P.tcl | SCUFRAMECNT TM5N | 31/62 1/3 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.7 Procedure SPIRE-FM-WFT-FUNC-SCU-07-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | Sorption cooler heat switches and pump heater show expected voltages |

**Procedure Steps:**

**Test Result (Pass/Fail):**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-07-P.tcl | — | — | — | — |
| 2 | **Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk** | BBFULLTYPE | Cooler_Htr_Chk | | |
| 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 | | |
| 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 | | |
| 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 | | |
| 6 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |

### 4.1.8 Procedure SPIRE-FM-WFT-FUNC-SCU-04-P

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 2007 |
| Purpose | Photometer Calibration 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 |
| Preconditions | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration | 3 minutes |
| Pass/Fail Criteria | PCAL voltage and current agree with expected values |

**Procedure Steps:**

| Step | Description | Parameter Name – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-04-P.tcl<br><br>**The expected values during the test should be monitored when parameter BBFULLTYPE in the FUNCTIONAL TEST PARAMETERS display is set to PCAL_Check This usually happens about 30 seconds from the start of test execution.** | PCALCURR - mA<br>PCALV – V<br><br><br>BBFULLTYPE | 0.0/0.1/0.0<br>0.0/0.02/0.0<br><br><br>PCAL_Check | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

**Final Configuration:** Unchanged

### 4.1.9 Procedure SPIRE-FM-WFT-FUNC-SCU-05-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer Calibration 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 |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-05-P.tcl | — | — | — | |
| 2 | **Wait for the parameter BBFULLTYPE to get set to SCAL4_Check** | BBFULLTYPE | SCAL4_Check | — | |
| 3 | A few seconds later record the value of parameters SCAL4CURR and SCAL4V *These parameters are set back to 0 after ~20 seconds* | SCAL4CURR – mA <br><br> SCAL4V – V | 0.0/0.10/0.0 <br><br> 0.0/0.05/0.0 | — | |
| 4 | **Wait for the parameter BBFULLTYPE to get set to SCAL2_Check** | BBFULLTYPE | SCAL2_Check | — | |
| 5 | A few seconds later record the values of parameters SCAL2CURR and SCAL2V *These parameters are set back to 0 after ~20 seconds* | SCAL2CURR – mA <br><br> SCAL2V – V | 0.0/0.10/0.0 <br><br> 0.0/0.05/0.0 | — | |
| 6 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.10  Procedure SPIRE-FM-WFT-FUNC-SCU-08-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SCU test pattern check |
| **Initial configuration** | SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | SCU Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-08-P.tcl | SCUFRAMECNT TM5N | 62/93 3/5 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success of the test.** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.11 Procedure SPIRE-FM-WFT-FUNC-MCU-01-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 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<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | MCU voltages and board temperatures show expected 'ON' values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-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 - V<br>MCUP14V - V<br>MCUM14V - V<br>MCUP15V - V<br>MCUM15V- V<br><br>MCUMACTEMP - K<br>MCUSMECTEMP - K<br>MCUBSMTEMP - K | ~ 5.0 ± 0.2<br>~ 14.0 ± 0.6<br>~ -14.0 ± 0.6<br>~ 15.0 ± 0.6<br>~ -15.0 ± 0.7<br><br>~300<br>~300<br>~300 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.12 Procedure: SPIRE-FM-WFT-FUNC-MCU-02-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | MCU Nominal Frame Generation 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-02-P.tcl | MCUFRAMECNT | 0/~ 6000 | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.13 Procedure: SPIRE-FM-WFT-FUNC-MCU-03-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-03-P.tcl | MCUFRAMECNT | ~6000/~ 6297 Should increment by 297 | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.14 Procedure: SPIRE-FM-WFT-FUNC-MCU-04-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | MCU Test Pattern 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | MCU Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-04-P.tcl | MCUFRAMECNT | N/N+99 | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.15  Procedure SPIRE-FM-WFT-FUNC-BSM-01-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (PRIME) Chop/Jiggle 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. BSM Chop/Jiggle sensors are ON. |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-01-P.tcl | — | — | — | — |
| 2 | Check that the Chop and Jiggle sensors have switched on | CHOPSENSPWR JIGGSENSPWR | 0/1/1 0/1/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.16 Procedure SPIRE-FM-WFT-FUNC-BSM-02C-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (PRIME) Chop Sensor Polarity 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. BSM Chop/Jiggle sensors are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MCU PRIME is booted. <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | CHOPSENSSIG HK parameter increments 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-02C-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.17  Procedure SPIRE-FM-WFT-FUNC-BSM-02J-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (PRIME) Jiggle Sensor Polarity 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. BSM Chop/Jiggle sensors are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MCU PRIME is booted. <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | JIGGSENSSIG HK parameter increments 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-02J-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.18  Procedure SPIRE-FM-WFT-FUNC-BSM-03-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 MCU PRIME is booted. BSM Chop/Jiggle sensors are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-03-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.19 Procedure SPIRE-FM-WFT-FUNC-BSM-05A-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-05A-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.20  Procedure SPIRE-FM-WFT-FUNC-BSM-05B-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (PRIME) Closed 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-BSM-INIT-P.tcl | CHOPLOOPMODE JIGGLOOPMODE | 3/-/1 3/-/1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-05B-P.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

## 4.1.21 Procedure SPIRE-FM-WFT-FUNC-BSM-06-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (PRIME) Operational Mode 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. BSM Chop/Jiggle sensors are ON. BSM is in closed loop. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-06-P.tcl | CHOPLOOPMODE<br>JIGGLOOPMODE | 1<br>1 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.22  Procedure SPIRE-FM-WFT-BSM-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 3 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-BSM-OFF-P.tcl | — | — | — | — |
| 2 | Check that the power to the BSM sensors is switched off | CHOPSENSPWR JIGGSENSPWR | 1/-/0 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

## 4.1.23  Procedure SPIRE-FM-WFT-FUNC-SMEC-01-P

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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 <br> • SPIRE MCU PRIME is booted. <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-01-P.tcl | — | — | — | — |
| 2 | Check that power to the SMEC LED and LVDT sensor is on | SMECENCPWR SMECLVDTPWR | 0/-/6 0/1/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.24 Procedure SPIRE-FM-WFT-FUNC-SMEC-03-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-03-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.25  Procedure SPIRE-FM-WFT-FUNC-SMEC-02A-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Open the SMEC Launch Latch (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 <br> • SPIRE MCU PRIME is booted. <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS <br> • **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | TBD |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-02A-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.26  Procedure SPIRE-FM-WFT-FUNC-SMEC-04A-P

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS<br>• **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC moves to the commanded positions |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-04A-P.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.27  Procedure SPIRE-FM-WFT-FUNC-SMEC-09-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **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 and MCU PRIME is booted. SMEC Encoder and LVDT are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS<br>• **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC performs a scan between the commanded positions |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ 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:<br><br>**SPIRE_SEND_DRCU_COMMAND**<br>• **param 1 = 0x9058xxxx**<br>• **param 2 = 0**<br><br>**SPIRE_SEND_DRCU_COMMAND**<br>• **param 1 = 0x905Axxxx**<br>• **param 2 = 0**<br><br>**The 16 bit parameters xxxx will be provided by SPIRE staff** | SMECENCSIG1OFF SMECENCSIG2OFF | | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-09-P.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.28  Procedure SPIRE-FM-WFT-FUNC-SMEC-07-P

| | |
| ---: | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS<br>• **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC performs a scan between the commanded positions and the loop remains closed |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-SMEC-INIT-P.tcl | SMECLOOPMODE | 6/-/1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-07-P.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

## 4.1.29  Procedure SPIRE-FM-WFT-FUNC-SMEC-02B-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 2007 |
| **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** | <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** | TBD |

**Procedure Steps:**

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

### 4.1.30 Procedure SPIRE-FM-WFT-SMEC-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 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<br>• SPIRE MCU PRIME is booted.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-SMEC-OFF-P.tcl | — | — | — | — |
| 2 | Check that the power to the SMEC sensors is switched off | SMECENCPWR SMECLVDTPWR | 6/-/0 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.31 Procedure SPIRE-FM-WFT-FUNC-DCU-01-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DCU science packet generation check for all Photometer and Spectrometer packet types (PF, PSW, PMW, PLW, SF, SSW and SLW) |
| **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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Specified DCU HK parameter shows expected increment |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-01-P.tcl | DCUFRAMECNT | n/n+700 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.32 Procedure SPIRE-FM-WFT-FUNC-DCU-02-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | To check the correct functioning of the DCU PRIME High Speed Link |
| **Initial configuration** | SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced and MCU is booted. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• I-EGSE is up and running<br>• DCU PARAMETERS display is selected on the CCS<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | The following DCU telemetry packet types are received at CCS with :<br>Full Photometer:<br> - (type,subtype): (21,1).<br> - APID 0x504<br>PSW<br> - (type,subtype): (21,2).<br> - APID 0x504<br>PMW<br> -(type,subtype): (21,2).<br> - APID 0x504<br>PLW<br> -(type,subtype): (21,2).<br> - APID 0x504<br>Full Spectrometer:<br> - (type,subtype): (21,1).<br> - APID 0x506<br>SSW<br> - (type,subtype): (21,2).<br> - APID 0x506<br>SLW<br> -(type,subtype): (21,2).<br> - APID 0x506 |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FM-DCU-02-P.tcl | DCUFRAMECNT | n/n+700 | | |
| 2 | Verify that the following type of DCU science telemetry packets have been received at the CCS : Full Photometer: - (type,subtype): (21,1). - APID 0x504 PSW - (type,subtype): (21,2). - APID 0x504 PMW -(type,subtype): (21,2). - APID 0x504 PLW -(type,subtype): (21,2). - APID 0x504 Full Spectrometer: - (type,subtype): (21,1). - APID 0x506 SSW - (type,subtype): (21,2). - APID 0x506 SLW -(type,subtype): (21,2). - APID 0x506 | — | — | — | |

**Test Result (Pass/Fail):**

### 4.1.33 Procedure SPIRE-FM-WFT-FUNC-DCU-03-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DCU Test Pattern 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU (Photometer/Spectrometer) Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-03-P.tcl | DCUFRAMECNT | n/n+700 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.34 Procedure SPIRE-FM-WFT-FUNC-DCU-04-PHOT-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Photometer LIAs 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 LIAs are ON. |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-04-PHOT-P.tcl | — | — | — | — |
| 2 | Check that the Photometer LIAs are switched on | PLIAP5V PLIAP9V PLIAM9V | ~0/ ~+5.17 ± 0.1V ~0/ ~+11.53 ± 0.1V ~0/ ~-11.53 ± 0.1V | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.35 Procedure SPIRE-FM-WFT-FUNC-DCU-11-PHOT-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-11-PHOT-P.tcl | — | — | — | — |
| 2 | Check that the Photometer detectors and LIAs are switched on | PSWJFETSTAT PMLWJFETSTAT PLIABITSTAT | 0/-/0x3F 0/-/0x7F 1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.36 Procedure SPIRE-FM-WFT-FUNC-DCU-13-PHOT-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | 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 |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 15 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that Photometer LIAs and detectors are switched on | PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT | 1 0x3F 0x7F | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-13-PHOT-P.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.37 Procedure SPIRE-FM-WFT-FUNC-DCU-14-PHOT-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 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** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Photometer BDAs signal show no excess noise |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that Photometer LIAs and detectors are switched on | PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT | 1 0x3F 0x7F | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-14-PHOT-P.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.38 Procedure SPIRE-FM-WFT-PDET-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | 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 OFF |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 3 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

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

### 4.1.39 Procedure SPIRE-FM-WFT-FUNC-DCU-04-SPEC-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer LIAs 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 LIAs are ON. |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-04-SPEC-P.tcl | — | — | — | — |
| 2 | Check that the Spectrometer LIAs are switched on | SLIAP5V - V<br>SLIAP9V - V<br>SLIAM9V - V | ~0/ ~+5.23 ± 0.1<br>~0/ ~+11.57 ± 0.1<br>~0/ ~-11.54 ± 0.1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

## 4.1.40 Procedure SPIRE-FM-WFT-FUNC-DCU-11-SPEC-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-11-SPEC-P.tcl | — | — | — | — |
| 2 | Check that the Spectrometer detectors are switched on | SPECJFETSTAT SLIABITSTAT | 0/-/7 1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.41  Procedure SPIRE-FM-WFT-FUNC-DCU-13-SPEC-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 12 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that the Spectrometer detectors and LIAs are switched on | SPECJFETSTAT SLIABITSTAT | 7 1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-13-SPEC-P.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.42 Procedure SPIRE-FM-WFT-FUNC-DCU-14-SPEC-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 and MCU PRIME is booted and Spectrometer BDAs are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Spectrometers BDAs signal show no excess noise |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that the Spectrometer detectors and LIAs are switched on | SPECJFETSTAT<br>SLIABITSTAT | 7<br>1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-14-SPEC-P.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.43 Procedure SPIRE-FM-WFT-SDET-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU PRIME is switched ON <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

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

### 4.1.44  Procedure SPIRE-FM-WFT-MCU-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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<br>• SPIRE MCU PRIME is ON.<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 2 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-MCU-OFF-P.tcl | — | — | — | — |
| 2 | Check that the MCU is switched off | MCUBITSTAT | 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.45 Procedure SPIRE-FM-WFT-SCU-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 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 <br> • SPIRE MIB PRIME is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 2 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-SCU-OFF-P.tcl | — | — | — | — |
| 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 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.46 Procedure SPIRE-FM-WFT-DRCU-OFF-P

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 2007 |
| **Purpose** | DRCU 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 PRIME is ON, SPIRE DRCU PRIME is OFF and SPIRE HK is not being produced. |
| **Preconditions** | <ul><li>SPIRE-FM-WFT-SCU-OFF has been executed.</li><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** | THSK and TM2N stop refreshing/incrementing |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-DRCU-OFF-P.tcl | — | — | — | |
| 2 | Check that THSK parameter is not refreshing anymore | THSK | Not refreshing | — | |
| 3 | Check that TM2N parameter is not incrementing anymore | TM2N | Not incrementing | — | |
| 4 | **Power OFF the SPIRE DRCU PRIME unit.** | — | — | — | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.47 Procedure SPIRE-FM-WFT-DPU-OFF-P

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DPU PRIME Switch OFF |
| **Initial configuration** | SPIRE DPU PRIME is ON but not generating HK. |
| **Final configuration** | SPIRE DPU PRIME is OFF. |
| **Preconditions** | • SPIRE-FM-WFT-DRCU-OFF has been executed.<br>• SPIRE DPU PRIME is switched ON<br>• SPIRE MIB PRIME is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Power to SPIRE DPU PRIME is OFF |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | **Power OFF the SPIRE DPU PRIME unit.** | — | — | — | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.1.48 Procedure SPIRE-FM-WFT-LPU-01-P

| | |
|---|---|
| **Version** | 1.0 |
| **Date** | Tuesday, 28 August 2007 |
| **Purpose** | DPU PRIME Switch OFF |
| **Initial configuration** | Prime and redundant DPU and DRCU are off |
| **Final configuration** | Prime and redundant DPU and DRCU are off |
| **Constraints** | • Cryostat is vertical to within ±45º<br>• Prime and redundant DPU and DRCU are off |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | The specified current is drawn when the LPU is enabled and is switched off when the LPU is disabled |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | **Power on Prime LPU LCL (LCL #25)** | LCL status | OFF/ /ON | | State of LCL #25 switches to ON |
| 2 | **Send HL command #5 (LPU Enable Prime)** | LCL #25 current | 0mA/ /130-180mA | | Current between 130-180mA |
| 4 | **Send HL command #6 (LPU Disable Prime)** | LCL #25 current | 130-180mA/ /0mA | | Current off |
| 5 | **Un-power Prime LPU LCL (LCL # 25)** | LCL status | ON/ / OFF | | State of LCL #25 switches to OFF |
| **Test Result (Pass/Fail):** | | | | | |

## 4.2 REDUNDANT Instrument

### 4.2.1 Procedure SPIRE-FM-WFT-DPU-ON-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 2007 |
| **Purpose** | To switch on the SPIRE DPU REDUNDANT and start generating housekeeping |
| **Initial configuration** | SPIRE DPU and DRCU REDUNDANT are switched off |
| **Final configuration** | SPIRE DPU REDUNDANT is ON and SPIRE HK is being produced , SPIRE DRCU REDUNDANT is OFF |
| **Preconditions** | • SPIRE FM DPU is electrically integrated with the Herschel Satellite<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/After | Actual Values Before/After | Pass/ Fail |
|---|---|---|---|---|---|
| 1 | Select DPU AND OBS PARAMETERS display is on the CCS | — | — | — | |
| 2 | **Power ON the SPIRE DPU REDUNDANT unit using the dedicated spacecraft LCL line and configure 1553 Spacecraft bus for SPIRE DPU REDUNDANT (RT = 22)** | — | — | — | |
| 3 | Wait for the boot software to produce at least 2 event packets (5,1) | | | | |
| 4 | Execute TCL script SPIRE-FM-WFT-DPU-START-R-PP.tcl | — | — | — | |
| 5 | Check that Nominal and Critical HK packets are arriving at the CCS: **SPIRE Nominal HK:** <ul><li>(type ,subtype) : (3,25)</li><li>APID : 0x503</li></ul> **SPIRE Critical HK:** <ul><li>(type ,subtype) : (3,25)</li><li>APID: 0x501</li></ul> | | | | |
| 6 | Check that THSK parameter is refreshing every second | THSK | Refreshing @ 1 Hz | — | |
| 7 | Check that TM2N parameter is incrementing by 1 every second | TM2N | Incrementing by 1 @ 1Hz | — | |
| 8 | Check that TM1N parameter is incrementing by 1 every 2 second | TM1N | Incrementing by 1 @ 0.5Hz | | |
| 9 | **On CCS check the consistency of the SPIRE on board time to the HCDMU time and the CCS.** * | — | — | | |
| 10 | On I-EGSE check the consistency between SCOS time and THSK and QLA time. | THSK | Incrementing once per second | | |
| **Test Result (Pass/Fail):** | | | | | |

**\*** Assuming that OBT is provided by the HCDMU following RD02, i.e, OBT is TAI, there should be a 33 second difference between OBS and CCS time (assuming CCS is using UTC). In the case the HCDMU is using UTC to specify the on board time, there should be no difference between THSK and the CCS/I-EGSE system time.

### 4.2.2 Procedure SPIRE-FM-WFT-DRCU-ON-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | To switch on the SPIRE DRCU REDUNDANT and start generating housekeeping |
| **Initial configuration** | SPIRE DPU REDUNDANT is ON and DRCU REDUNDANT is switched OFF |
| **Final configuration** | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced |
| **Preconditions** | • SPIRE FM DRCU is electrically integrated with the Herschel Satellite<br>• SPIRE DRCU is switched OFF<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 4 minutes |
| **Pass/Fail Criteria** | DRCU voltages show expected 'ON' values |

**Procedure steps:**

| Step | Description | Parameter - Unit | Expected Values Before/After | Actual Values Before/After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-DRCU-START-R-STEP1.tcl | — | — | — | |
| 2 | Check that THSK parameter is not refreshing anymore | THSK | Not refreshing | — | |
| 3 | Check that TM2N parameter is not incrementing anymore | TM2N | Not incrementing | — | |
| 4 | **Power ON the SPIRE DRCU REDUNDANT unit using the dedicated spacecraft LCL line.** | — | — | — | |
| 5 | Execute TCL script SPIRE-FM-WFT-DRCU-START-R-STEP2.tcl | — | — | — | |
| 6 | Check that THSK parameter is again refreshing every second | THSK | Refreshing @ 1Hz | | |
| 7 | Check that TM2N parameter is again incrementing every second | TM2N | Incrementing by 1 @ 1Hz | — | |
| 8 | Check that the SCU/DCU voltages show nominal values | SCUP5V - V<br>SCUP9V - V<br>SCUM9V - V<br>BIASP5V - V<br>BIASP9V - V<br>BIASM9V - V | ~ $5.2 \pm 0.5$<br>~ $9.0 \pm 0.2$<br>~ $-9.0 \pm 0.2$<br>~ $5.1 \pm 0.5$<br>~ $9.0 \pm 0.2$<br>~ $-9.0 \pm 0.2$ | — | |

**Test Result (Pass/Fail):**

### 4.2.3 Procedure SPIRE-FM-WFT-FUNC-SCU-01-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SCU science packet generation check |
| **Initial configuration** | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS |
| **Duration** | 3 minutes |
| **Pass/Fail Criteria** | Specified SCU HK parameters show expected increment. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-01-R.tcl | SCUFRAMECNT TM5N | 0/31 0x3FFF/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.4 Procedure SPIRE-FM-WFT-FUNC-SCU-03-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• SFT PARAMETERS display is selected on the CCS |
| **Duration** | 8 minutes |
| **Pass/Fail Criteria** | DC Thermometry channels show temperature readings according to the actual instrument temperature*<br>*: At warm temperatures all channels should show short circuit RAW readings of -32768 |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-03-R.tcl | — | — | — | — |
| 2 | **Wait for the parameter BBFULLTYPE to get set to   SCU_DC_Therm** | | | | |
| 3 | A few seconds later record the value of parameter SCUTEMPSTAT | SCUTEMPSTAT | 0/0xFFFF/0xFFFF | | |
| 4 | **Configure the SFT PARAMETERS display to show the RAW values of SCU DC thermometry channels.**<br><br>Record the values of SCU DC thermometry channels. Nominal values should show a short circuit status (or RAW -32768)<br><br>**Non Nominal (Open Circuit Criterion):**<br>**RAW reading in the** | PUMPHTRTEMP<br>PUMPHSTEMP<br>EVAPHSTEMP<br>SHUNTTEMP<br>EMCFILTEMP<br>SL0TEMP<br>PL0TEMP<br>OPTTEMP<br>BAFTEMP<br>BSMIFTEMP<br>SCAL2TEMP<br>SCAL4TEMP<br>SCALTEMP<br>SMECIFTEMP<br>SMECTEMP | —<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>—<br>— | | |

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| | **range [0, -100]** | BSMTEMP | — | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.5 Procedure SPIRE-FM-WFT-FUNC-SCU-06-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• SFT PARAMETERS display is selected on the CCS |
| **Duration** | 2 minutes |
| **Pass/Fail Criteria** | AC Thermometry channel shows 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-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 | **Configure the SFT PARAMETERS display to show the RAW values of SCU AC thermometry channel.**<br><br>Record the value of SCU AC thermometry channel.<br><br>Nominal value should show a short circuit status (or RAW ~ -32768)<br><br>**Non Nominal (Open Circuit Criterion):**<br>**RAW reading in the range [0, -100]** | SUBKTEMP | — | | |

**Test Result (Pass/Fail):**

### 4.2.6 Procedure SPIRE-FM-WFT-FUNC-SCU-02-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SCU Nominal Science Contents Check |
| **Initial configuration** | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | Specified SCU HK parameters show expected increment. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-02-R.tcl | SCUFRAMECNT TM5N | 31/62 1/3 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.7 Procedure SPIRE-FM-WFT-FUNC-SCU-07-R

| | |
|---|---|
| Version | 2.4 |
| Date | 16th Oct. 2007 |
| Purpose | Sorption Cooler Heater 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 |
| Preconditions | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration | 5 minutes |
| Pass/Fail Criteria | Sorption cooler heat switches and pump heater show expected voltages |

**Procedure Steps:**

| Test Result (Pass/Fail): | | | | | |
|---|---|---|---|---|---|
| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-07-R.tcl | — | — | — | — |
| 2 | **Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk** | BBFULLTYPE | Cooler_Htr_Chk | | |
| 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 | | |
| 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 | | |
| 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 | | |
| 6 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |

### 4.2.8 Procedure SPIRE-FM-WFT-FUNC-SCU-04-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Photometer Calibration 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 |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 3 minutes |
| **Pass/Fail Criteria** | PCAL voltage and current agree with expected values |

**Procedure Steps:**

| Step | Description | Parameter Name – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-04-R.tcl<br><br>**The expected values during the test should be monitored when parameter BBFULLTYPE in the FUNCTIONAL TEST PARAMETERS display is set to PCAL_Check This usually happens about 30 seconds from the start of test execution.** | PCALCURR - mA<br>PCALV – V<br><br><br><br>BBFULLTYPE | 0.0/0.1/0.0<br>0.0/0.02/0.0<br><br><br><br>PCAL_Check | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

**Final Configuration:** Unchanged

### 4.2.9  Procedure SPIRE-FM-WFT-FUNC-SCU-05-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer Calibration 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 |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-05-R.tcl | — | — | — | |
| 2 | **Wait for the parameter BBFULLTYPE to get set to SCAL4_Check** | BBFULLTYPE | SCAL4_Check | — | |
| 3 | A few seconds later record the value of parameters SCAL4CURR and SCAL4V *These parameters are set back to 0 after ~20 seconds* | SCAL4CURR – mA<br><br>SCAL4V – V | 0.0/0.10/0.0<br><br>0.0/0.05/0.0 | — | |
| 4 | **Wait for the parameter BBFULLTYPE to get set to SCAL2_Check** | BBFULLTYPE | SCAL2_Check | — | |
| 5 | A few seconds later record the values of parameters SCAL2CURR and SCAL2V *These parameters are set back to 0 after ~20 seconds* | SCAL2CURR – mA<br><br>SCAL2V – V | 0.0/0.10/0.0<br><br>0.0/0.05/0.0 | — | |
| 6 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.10 Procedure SPIRE-FM-WFT-FUNC-SCU-08-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SCU test pattern check |
| **Initial configuration** | SPIRE DPU and DRCU REDUNDANT are ON and SPIRE HK is being produced |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail Criteria** | SCU Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SCU-08-R.tcl | SCUFRAMECNT TM5N | 62/93 3/5 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success of the test.** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.11  Procedure SPIRE-FM-WFT-FUNC-MCU-01-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration | 5 minutes |
| Pass/Fail criteria | MCU voltages and board temperatures show expected 'ON' values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-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 - V<br>MCUP14V - V<br>MCUM14V - V<br>MCUP15V - V<br>MCUM15V- V<br><br>MCUMACTEMP - K<br>MCUSMECTEMP - K<br>MCUBSMTEMP - K | ~ $5.0 \pm 0.2$<br>~ $14.0 \pm 0.6$<br>~ $-14.0 \pm 0.6$<br>~ $15.0 \pm 0.6$<br>~ $-15.0 \pm 0.7$<br><br>~300<br>~300<br>~300 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.12 Procedure: SPIRE-FM-WFT-FUNC-MCU-02-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | MCU Nominal Frame Generation 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<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-02-R.tcl | MCUFRAMECNT | 0/~ 6000 | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.13 Procedure: SPIRE-FM-WFT-FUNC-MCU-03-R

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 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<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-03-R.tcl | MCUFRAMECNT | ~6000/~ 6297 Should increment by 297 | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.14 Procedure: SPIRE-FM-WFT-FUNC-MCU-04-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | MCU Test Pattern 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 <br> • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | MCU Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-MCU-04-R.tcl | MCUFRAMECNT | N/N+99 | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.15  Procedure SPIRE-FM-WFT-FUNC-BSM-01-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-01-R.tcl | — | — | — | — |
| 2 | Check that the Chop and Jiggle sensors have switched on | CHOPSENSPWR JIGGSENSPWR | 0/1/1 0/1/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.16  Procedure SPIRE-FM-WFT-FUNC-BSM-02C-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (REDUNDANT) Chop Sensor Polarity 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | CHOPSENSSIG HK parameter increments 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-02C-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.17 Procedure SPIRE-FM-WFT-FUNC-BSM-02J-R

| | |
|---|---|
| Version | 2.4 |
| Date | 16th Oct. 2007 |
| Purpose | BSM (REDUNDANT) Jiggle Sensor Polarity 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 | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration | 5 minutes |
| Pass/Fail criteria | JIGGSENSSIG HK parameter increments 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-02J-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| Test Result (Pass/Fail): | | | | | |

### 4.2.18 Procedure SPIRE-FM-WFT-FUNC-BSM-03-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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 | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-03-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.19 Procedure SPIRE-FM-WFT-FUNC-BSM-05A-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-05A-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

## 4.2.20 Procedure SPIRE-FM-WFT-FUNC-BSM-05B-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (REDUNDANT) Closed 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-BSM-INIT-R.tcl | CHOPLOOPMODE<br>JIGGLOOPMODE | 3/-/1<br>3/-/1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-05B-R.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.21 Procedure SPIRE-FM-WFT-FUNC-BSM-06-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | BSM (REDUNDANT) Operational Mode 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. BSM is in closed loop. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON <br> • SPIRE MCU REDUNDANT is booted. <br> • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS |
| **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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-BSM-06-R.tcl | CHOPLOOPMODE JIGGLOOPMODE | 1 1 | | |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.22 Procedure SPIRE-FM-WFT-BSM-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16$^{th}$ Oct. 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** | <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** | 3 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-BSM-OFF-R.tcl | — | — | — | — |
| 2 | Check that the power to the BSM sensors is switched off | CHOPSENSPWR JIGGSENSPWR | 1/-/0 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.23 Procedure SPIRE-FM-WFT-FUNC-SMEC-01-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-01-R.tcl | — | — | — | — |
| 2 | Check that power to the SMEC LED and LVDT sensor is on | SMECENCPWR SMECLVDTPWR | 0/-/6 0/1/1 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.24 Procedure SPIRE-FM-WFT-FUNC-SMEC-03-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 is ON and MCU REDUNDANT is booted. SMEC Encoder and LVDT are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-03-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.25  Procedure SPIRE-FM-WFT-FUNC-SMEC-02A-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Open the SMEC Launch Latch (Unlatch it) |
| **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 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<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS<br>• **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | TBD |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-02A-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.26  Procedure SPIRE-FM-WFT-FUNC-SMEC-04A-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SMEC (REDUNDANT) Open Loop Positioning 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. SMEC Encoder and LVDT are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON <br> • SPIRE MCU REDUNDANT is booted. <br> • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS <br> • **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC moves to the commanded positions |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-04A-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.27  Procedure SPIRE-FM-WFT-FUNC-SMEC-09-R

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SMEC (REDUNDANT) Open Loop Scan 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. 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><li>**The Herschel Cryostat should be tilted horizontal**</li></ul> |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC performs a scan between the commanded positions |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ 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**<ul><li>**param 1 = 0x9058xxxx**</li><li>**param 2 = 0**</li></ul>**SPIRE_SEND_DRCU_COMMAND**<ul><li>**param 1 = 0x905Axxxx**</li><li>**param 2 = 0**</li></ul>**The 16 bit parameters xxxx will be provided by SPIRE staff** | SMECECNSIG1OFF SMECENCSIG2OFF | | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-09-R.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.28  Procedure SPIRE-FM-WFT-FUNC-SMEC-07-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | SMEC (REDUNDANT) Close Loop Scan 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. SMEC Encoder and LVDT are ON. |
| **Final configuration** | SMEC is in closed loop |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is booted.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS<br>• **The Herschel Cryostat should be tilted horizontal** |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | SMEC performs a scan between the commanded positions and the loop remains closed |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-SMEC-INIT-R.tcl | SMECLOOPMODE | 6/-/1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-07-R.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.29 Procedure SPIRE-FM-WFT-FUNC-SMEC-02B-R

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Close the SMEC Launch Latch (Latch it) |
| **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 SMEC is ON and unlatched |
| **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 Latched |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON <br> • SPIRE MCU REDUNDANT is booted. <br> • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | TBD |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-SMEC-02B-R.tcl | — | — | — | — |
| 2 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | | | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.30  Procedure SPIRE-FM-WFT-SMEC-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-SMEC-OFF-R.tcl | — | — | — | — |
| 2 | Check that the power to the SMEC sensors is switched off | SMECENCPWR SMECLVDTPWR | 6/-/0 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.31  Procedure SPIRE-FM-WFT-FUNC-DCU-01-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DCU science packet generation check for all Photometer and Spectrometer packet types (PF, PSW, PMW, PLW, SF, SSW and SLW) |
| **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<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Specified DCU HK parameter shows expected increment |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-01-R.tcl | DCUFRAMECNT | n/n+700 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.32 Procedure SPIRE-FM-WFT-FUNC-DCU-02-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 2007 |
| Purpose | To check the correct functioning of the DCU REDUNDANT High Speed Link |
| Initial configuration | SPIRE DPU and DRCU REDUNDANT are switched ON, SPIRE HK is being produced and MCU is booted. |
| Final configuration | Unchanged |
| Preconditions | • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • I-EGSE is up and running <br> • DCU PARAMETERS display is selected on the CCS <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| Duration | 5 minutes |
| Pass/Fail criteria | The following DCU telemetry packet types are received at CCS with : <br> Full Photometer: <br> - (type,subtype): (21,1). <br> - APID 0x505 <br> PSW <br> - (type,subtype): (21,2). <br> - APID 0x505 <br> PMW <br> -(type,subtype): (21,2). <br> - APID 0x505 <br> PLW <br> -(type,subtype): (21,2). <br> - APID 0x505 <br> Full Spectrometer: <br> - (type,subtype): (21,1). <br> - APID 0x507 <br> SSW <br> - (type,subtype): (21,2). <br> - APID 0x507 <br> SLW <br> -(type,subtype): (21,2). <br> - APID 0x507 |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FM-DCU-02-R.tcl | DCUFRAMECNT | n/n+700 | | |

| 2 | Verify that the following type of DCU science telemetry packets have been received at the CCS : | — | — | — | |
| --- | --- | --- | --- | --- | --- |
| | Full Photometer: | | | | |
| | - (type,subtype): (21,1). | | | | |
| | - APID 0x505 | | | | |
| | PSW | | | | |
| | - (type,subtype): (21,2). | | | | |
| | - APID 0x505 | | | | |
| | PMW | | | | |
| | -(type,subtype): (21,2). | | | | |
| | - APID 0x505 | | | | |
| | PLW | | | | |
| | -(type,subtype): (21,2). | | | | |
| | - APID 0x505 | | | | |
| | Full Spectrometer: | | | | |
| | - (type,subtype): (21,1). | | | | |
| | - APID 0x507 | | | | |
| | SSW | | | | |
| | - (type,subtype): (21,2). | | | | |
| | - APID 0x507 | | | | |
| | SLW | | | | |
| | -(type,subtype): (21,2). | | | | |
| | - APID 0x507 | | | | |

**Test Result (Pass/Fail):**

### 4.2.33  Procedure SPIRE-FM-WFT-FUNC-DCU-03-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DCU Test Pattern 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<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU (Photometer/Spectrometer) Test Pattern generated agrees with the one generated on a previous execution. |

**Procedure Steps:**

| Step | Description | Parameter | Expected Values Before/ After | Actual Values Before /After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-03-R.tcl | DCUFRAMECNT | n/n+700 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.34 Procedure SPIRE-FM-WFT-FUNC-DCU-04-PHOT-R

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Photometer LIAs 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 LIAs are ON. |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-04-PHOT-R.tcl | — | — | — | — |
| 2 | Check that the Photometer LIAs are switched on | PLIAP5V PLIAP9V PLIAM9V | ~0/ ~+5.19 ± 0.1V ~0/ ~+11.54 ± 0.1V ~0/ ~-11.53 ± 0.1V | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.35 Procedure SPIRE-FM-WFT-FUNC-DCU-11-PHOT-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-11-PHOT-R.tcl | — | — | — | — |
| 2 | Check that the Photometer detectors and LIAs are switched on | PSWJFETSTAT PMLWJFETSTAT PLIABITSTAT | 0/-/0x3F 0/-/0x7F 1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.36 Procedure SPIRE-FM-WFT-FUNC-DCU-13-PHOT-R

| | |
| --- | --- |
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 15 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
| --- | --- | --- | --- | --- | --- |
| 1 | Check that Photometer LIAs and detectors are switched on | PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT | 1 0x3F 0x7F | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-13-PHOT-R.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.37  Procedure SPIRE-FM-WFT-FUNC-DCU-14-PHOT-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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 is ON and MCU REDUNDANT is booted and Photometer BDAs are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Photometer BDAs signal show no excess noise |

**Procedure Steps:**

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

### 4.2.38 Procedure SPIRE-FM-WFT-PDET-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Photometer 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 Photometer BDAs 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 and Photometer BDAs are OFF |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 3 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-PDET-OFF-R.tcl | — | — | | |
| 2 | Check that the Photometer detectors are switched off | PSWJFETSTAT PMLWJFETSTAT | 0x3F/-/0 0x7F/-/0 | | |
| 3 | Check that the Photometer LIAs are switched off | PLIABITSTAT | 1/-/0 | | |
| 4 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.39 Procedure SPIRE-FM-WFT-FUNC-DCU-04-SPEC-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer LIAs 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 Spectrometer LIAs are ON. |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON <br> • SPIRE MIB REDUNDANT is imported in the CCS database. <br> • CCS is up and running <br> • FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-04-SPEC-R.tcl | — | — | — | — |
| 2 | Check that the Spectrometer LIAs are switched on | SLIAP5V - V <br> SLIAP9V - V <br> SLIAM9V - V | ~0/ ~+5.23 ± 0.1 <br> ~0/ ~+11.57 ± 0.1 <br> ~0/ ~-11.54 ± 0.1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.40 Procedure SPIRE-FM-WFT-FUNC-DCU-11-SPEC-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer 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 Spectrometer BDAs are ON. |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-11-SPEC-R.tcl | — | — | — | — |
| 2 | Check that the Spectrometer detectors are switched on | SPECJFETSTAT SLIABITSTAT | 0/-/7 1 | | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.41 Procedure SPIRE-FM-WFT-FUNC-DCU-13-SPEC-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | Spectrometer 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 Spectrometer BDAs are ON. |
| **Final configuration** | Unchanged |
| **Preconditions** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 12 minutes |
| **Pass/Fail criteria** | DCU HK parameters show expected values |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that the Spectrometer detectors and LIAs are switched on | SPECJFETSTAT SLIABITSTAT | 7 1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-13-SPEC-R.tcl | — | — | — | |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.42 Procedure SPIRE-FM-WFT-FUNC-DCU-14-SPEC-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Spectrometers BDAs signal show no excess noise |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Check that the Spectrometer detectors and LIAs are switched on | SPECJFETSTAT<br>SLIABITSTAT | 7<br>1 | | |
| 2 | Execute TCL script SPIRE-FM-WFT-FUNC-DCU-13-SPEC-R.tcl | — | — | — | — |
| 3 | **Wait for the I-EGSE staff to confirm the success or failure of this test** | — | — | — | — |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.43  Procedure SPIRE-FM-WFT-SDET-OFF-R

| Version | 2.4 |
|---|---|
| Date | 16th Oct. 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 | 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 OFF |
| 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 | DCU HK parameters show expected values |

**Procedure Steps:**

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

### 4.2.44 Procedure SPIRE-FM-WFT-MCU-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MCU REDUNDANT is ON.<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 2 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute SPIRE-FM-WFT-MCU-OFF-R.tcl | — | — | — | — |
| 2 | Check that the MCU is switched off | MCUBITSTAT | 1/-/0 | | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.45 Procedure SPIRE-FM-WFT-SCU-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 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** | • SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 2 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/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-SCU-OFF-R.tcl | — | — | — | — |
| 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 | | |
| **Test Result (Pass/Fail):** | | | | | |

Spire Procedure

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### 4.2.46 Procedure SPIRE-FM-WFT-DRCU-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | DRCU 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 REDUNDANT is ON, SPIRE DRCU REDUNDANT is OFF and SPIRE HK is not being produced. |
| **Preconditions** | • SPIRE-FM-WFT-SCU-OFF has been executed.<br>• SPIRE DRCU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | THSK and TM2N stop refreshing/incrementing |

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | Execute TCL script SPIRE-FM-WFT-DRCU-OFF-R.tcl | — | — | — | |
| 2 | Check that THSK parameter is not refreshing anymore | THSK | Not refreshing | — | |
| 3 | Check that TM2N parameter is not incrementing anymore | TM2N | Not incrementing | — | |
| 4 | **Power OFF the SPIRE DRCU REDUNDANT unit.** | — | — | — | |
| **Test Result (Pass/Fail):** | | | | | |

Spire Procedure

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### 4.2.47  Procedure SPIRE-FM-WFT-DPU-OFF-R

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16<sup>th</sup> Oct. 2007 |
| **Purpose** | DPU REDUNDANT Switch OFF |
| **Initial configuration** | SPIRE DPU REDUNDANT is ON but not generating HK. |
| **Final configuration** | SPIRE DPU REDUNDANT is OFF. |
| **Preconditions** | • SPIRE-FM-WFT-DRCU-OFF has been executed.<br>• SPIRE DPU REDUNDANT is switched ON<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | Power to SPIRE DPU REDUNDANT is OFF |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | **Power OFF the SPIRE DPU REDUNDANT unit.** | — | — | — | |
| **Test Result (Pass/Fail):** | | | | | |

### 4.2.48 Procedure SPIRE-FM-WFT-LPU-01-R

| | |
|---|---|
| **Version** | 1.0 |
| **Date** | Tuesday, 28 August 2007 |
| **Purpose** | DPU PRIME Switch OFF |
| **Initial configuration** | Prime and redundant DPU and DRCU are off |
| **Final configuration** | Prime and redundant DPU and DRCU are off |
| **Constraints** | • Cryostat is vertical to within ±45° <br> • Prime and redundant DPU and DRCU are off |
| **Duration** | 5 minutes |
| **Pass/Fail criteria** | The specified current is drawn when the LPU is enabled and is switched off when the LPU is disabled |

**Procedure Steps:**

| Step | Description | Parameter – Unit | Expected Values Before/ During/ After | Actual Values Before/ During/ After | Success/ Failure |
|---|---|---|---|---|---|
| 1 | **Power on Redundant LPU LCL (LCL #26)** | LCL status | OFF/ /ON | | State of LCL #26 switches to ON |
| 3 | **Send HL command #21 (LPU Enable Redundant)** | LCL #26 current | 0mA/ /130-180mA | | Current between 130-180mA |
| 4 | **Send HL command #22 (LPU Disable Redundant)** | LCL #26 current | 130-180mA/ /0mA | | Current off |
| 5 | **Un-power Prime LPU LCL (LCL # 25)** | LCL status | ON/ / OFF | | State of LCL #26 switches to OFF |
| **Test Result (Pass/Fail):** | | | | | |

# 5. Safe switch off

The following procedure describes the necessary steps to safely switch off SPIRE if an anomaly should occur.

## 5.1 SPIRE-SAFE-SWITCH-OFF

| | |
|---|---|
| **Version** | 2.4 |
| **Date** | 16th Oct. 2007 |
| **Purpose** | To switch OFF the SPIRE instrument if an anomaly should occur |
| **Initial configuration** | SPIRE can be on ANY configuration as specified on the procedure steps |
| **Final configuration** | SPIRE is OFF |
| **Preconditions** | • SPIRE FM DPU is electrically integrated with the Herschel Satellite<br>• SPIRE MIB REDUNDANT is imported in the CCS database.<br>• CCS is up and running<br>• FUNCTIONAL TEST PARAMETERS display is selected on the CCS |
| **Duration** | ~5-8 minutes |
| **Pass/Fail Criteria** | SPIRE is OFF.<br>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.**

**Procedure Steps:**

| Step | Description | Parameter - Unit | Expected value before/ after | Actual value before/ after |
| --- | --- | --- | --- | --- |
| 1. | Execute Procedures:<br>▪ SPIRE-FM-WFT-PDET-OFF-P/R<br><br>▪ SPIRE-FM-WFT-BSM-OFF-P/R | PLIABITSAT<br>PSWJFETSTAT<br><br>PMLWJFETSTAT<br>CHOPSENSPWR | **- / 0**<br>**- / 0**<br><br>**- / 0**<br>**- / 0** | |
| 2. | Execute Procedures:<br>▪ SPIRE-FM-WFT-SDET-OFF-P/R<br><br>▪ SPIRE-FM-WFT-SMEC-OFF-P/R | SLIABITSAT<br>SPECJFETSTAT<br><br>SMECENCPWR<br>SMECLVDTPWR | **- / 0**<br>**- / 0**<br><br>**- / 0**<br>**- / 0** | |
| 3. | Execute Procedures:<br>▪ SPIRE-FM-WFT-MCU-OFF-P/R<br><br>▪ SPIRE-FM-WFT-SCU-OFF-P/R | MCUBITSTAT<br><br><br>SCUTEMPSTAT<br>SUBKSTAT | **- / 0**<br><br><br>**- / 0**<br>**- / 0** | |
| 4. | Execute Procedure:<br>▪ SPIRE-FM-WFT-DRCU-OFF-P/R | TM2N<br>THSK | **- / Not updating** | |
| 5. | Execute Procedure:<br>▪ SPIRE-FM-WFT-DPU-OFF-P/R | — | — | |