1. Introduction

This document reports on the results of first Short Functional Test (SFT) carried out on 11th February 2008 following bake out. **All the tests, on both the PRIME and REDUNDANT instrument, were completed successfully.**

1.1 Scope

1.2 Change Record

Doc	#	Changes	Date of Change
Issue	1.0	First version	20th March 2008

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 Warm Functional Test Procedures for the CCS	SPIRE-RAL-PRC-002422	1.4	15/07/2005
RD02	SPIRE 3rd Warm Functional Test Report	HP-2-ASED-TR-0077_1_0	1.0	19/07/2005
RD03	Minutes of meeting TRR/PTR for SPIRE SFT Warm prior to Cryostat EQM Cool Down	HP-2-ASED-MN-1039		22/08/2005
RD04	SPIRE Instrument User Manual	SPIRE-RAL-PRJ-002395	1.3	09/11/2007

1.5 Duration

These tests were completed within the allotted of **~1.5 hours** for each side of the instrument, well within the initial estimated duration of 4 hours.

1.6 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

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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 FM 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 & IEGSE:

- The CCS and the IEGSE were interconnected via the Pipe GW.
- The SPIRE MIB FM_2.2.G7_PR was imported into the HPSDB and available on the CCS.
- IEGSE system was up and running. (Database, SCOS , QLA, EGSE Router and Gateway, TM ingestion)
    - SCOS MIB SPIRE_FM_2.2.G6_PR
    - QLA v 3.3
    - SPIRE Build #727
    - HCSS Build #1430
    - Database spire_fm_ist_db1@spireqla

2.2 Test Scripts

The standalone test scripts for the SFTs were delivered to the CCS on 10th Sept 2007. The scripts were at version 1.1 and tagged SPIRE_SFT_PROC_V2_4.

3. SHORT FUNCTIONAL TEST PROCEDURES OVERVIEW

3.1 General instructions for executing test procedures

- Section 3.4 of this document specifies the sequence to be executed. Each of the steps in the sequence has a detailed specification later on sections 4.1 and 4.2. The operator should refer to the later in order to execute detailed steps and the full procedure.
- 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.

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.

3.3 Test Sequence

This section specifies the sequence to be executed with estimated times for each execution. **During AVM, although no redundancy is present, the redundant procedures can still be tested.**

Step #	Procedure Name	Purpose	Estimated Duration
1.	SPIRE-FM-SFT-DPU-ON-P	DPU PRIME Power up and OBS start	5 min
2.	SPIRE-FM-SFT-DRCU-ON-P	DRCU PRIME Power up	4 min
3.	SPIRE-FM-SFT-FUNC-SCU-01-P	SCU Nominal Science Packet Generation Check PRIME	3 min
4.	SPIRE-FM-SFT-FUNC-SCU-03-P	SCU DC Thermometry check PRIME	8 min
5.	SPIRE-FM-SFT-FUNC-SCU-06-P	SCU AC Thermometry check PRIME	2 min
6.	SPIRE-FM-SFT-FUNC-SCU-07-P	Sorption Cooler Heaters Check PRIME	5 min
7.	SPIRE-FM-SFT-FUNC-SCU-04-P	Photometer Calibrator Check PRIME	3 min
8.	SPIRE-FM-SFT-FUNC-SCU-05-P	Spectrometer Calibrator Check PRIME	5 min
9.	SPIRE-FM-SFT-FUNC-MCU-01-P	MCU Boot Check PRIME	5 min
10.	SPIRE-FM-SFT-FUNC-MCU-02-P	MCU Nominal Science Packet Generation Check PRIME	5 min
11.	SPIRE-FM-SFT-FUNC-BSM-01-P	BSM Chop/Jiggle Sensors check PRIME	3 min
12.	SPIRE-FM-SFT-BSM-0FF-P	BSM switch OFF PRIME	3 min
13.	SPIRE-FM-SFT-FUNC-SMEC-01-P	SMEC Encoder and LVDT check PRIME	3 min
14.	SPIRE-FM-SFT-SMEC-OFF-P	SMEC switch OFF	3 min
15.	SPIRE-FM-SFT-FUNC-DCU-01-P	DCU Science Packet Generation Check PRIME	5 min
16.	SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P	Photometer LIAs Check PRIME	5 min
17.	SPIRE-FM-SFT-PLIA-OFF-P	Photometer LIAs Switch OFF PRIME	2 min
18.	SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P	Spectrometer LIAs Check PRIME	5 min
19.	SPIRE-FM-SFT-SLIA-OFF-P	Spectrometer LIAs Switch OFF PRIME	2 min
20.	SPIRE-FM-SFT-MCU-OFF-P	MCU switch OFF PRIME	2 min
21.	SPIRE-FM-SFT-SCU-OFF-P	SCU Switch OFF PRIME	2 min
22.	SPIRE-FM-SFT-DRCU-OFF-P	DRCU Power OFF PRIME	5 min
23.	SPIRE-FM-SFT-DPU-OFF-P	DPU Power OFF PRIME	5 min
24.	SPIRE-FM-SFT-LPU-01-P	Checkout of LPU PRIME	5 min
25.	**Change to SPIRE Redundant MIB on the CCS (If required)**		5 min?
26.	**Configure 1553 Spacecraft bus from SPIRE DPU PRIME to SPIRE DPU REDUNDANT.**		5 min?
27.	SPIRE-FM-SFT-DPU-ON-R	DPU REDUNDANT Power up and OBS start	5 min
28.	SPIRE-FM-SFT-DRCU-ON-R	DRCU REDUNDANT Power up	4 min
29.	SPIRE-FM-SFT-FUNC-SCU-01-R	SCU Nominal Science Packet Generation Check REDUNDANT	3 min
30.	SPIRE-FM-SFT-FUNC-SCU-03-R	SCU DC Thermometry Check REDUNDANT	8 min
31.	SPIRE-FM-SFT-FUNC-SCU-06-R	SCU AC Thermometry Check REDUNDANT	2 min

32.	SPIRE-FM-SFT-FUNC-SCU-07-R	Sorption Cooler Heaters Check REDUNDANT	5 min
33.	SPIRE-FM-SFT-FUNC-SCU-04-R	Photometer Calibrator Check REDUNDANT	3 min
34.	SPIRE-FM-SFT-FUNC-SCU-05-R	Spectrometer Calibrator Check REDUNDANT	5 min
35.	SPIRE-FM-SFT-FUNC-MCU-01-R	MCU Boot Check REDUNDANT	5 min
36.	SPIRE-FM-SFT-FUNC-MCU-02-R	MCU Nominal Science Packet Generation Check REDUNDANT	5 min
37.	SPIRE-FM-SFT-FUNC-BSM-01-R	BSM Chop/Jiggle Sensors check REDUNDANT	3 min
38.	SPIRE-FM-SFT-BSM-0FF-R	BSM Switch OFF REDUNDANT	3 min
39.	SPIRE-FM-SFT-FUNC-SMEC-01-R	SMEC Encoder and LVDT check REDUNDANT	3 min
40.	SPIRE-FM-SFT-SMEC-OFF-R	SMEC Switch OFF	3 min
41.	SPIRE-FM-SFT-FUNC-DCU-01-R	DCU Science Packet Generation Check REDUNDANT	5 min
42.	SPIRE-FM-SFT-FUNC-DCU-04-PHOT-R	Photometer LIAs Check REDUNDANT	5 min
43.	SPIRE-FM-SFT-PLIA-OFF-R	Photometer LIAs Switch OFF REDUNDANT	2 min
44.	SPIRE-FM-SFT-FUNC-DCU-04-SPEC-R	Spectrometer LIAs Check REDUNDANT	5 min
45.	SPIRE-FM-SFT-SLIA-OFF-R	Spectrometer LIAs Switch OFF REDUNDANT	2 min
46.	SPIRE-FM-SFT-MCU-OFF-R	MCU Switch OFF REDUNDANT	2 min
47.	SPIRE-FM-SFT-SCU-OFF-R	SCU Switch OFF REDUNDANT	2 min
48.	SPIRE-FM-SFT-DRCU-OFF-R	DRCU Power OFF REDUNDANT	5 min
49.	SPIRE-FM-SFT-DPU-OFF-R	DPU Power OFF REDUNDANT	5 min
50.	SPIRE-FM-SFT-LPU-01-R	Checkout of LPU REDUNDANT	5 min
		Total:	**~3-4 Hours**

4. DETAILED SHORT FUNCTIONAL TEST PROCEDURES

4.1 PRIME Instrument

4.1.1 Procedure SPIRE-FM-SFT-DPU-ON-P

Version	2.3
Date	28th August 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 • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively.

Procedure Steps for FM:

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-SFT-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		✓
Test Result (Pass/Fail): Pass – See comments below					

Comments:

- The DPU was switched on at 09:48 UT, 11th Feb 2008.
- The DPUM15V parameter was seen in soft low limit at -15.8915V. After discussion with IFSI, it was decided that this is not a problem but the limits in the MIB need to be changed.
- OBS 2.2.G was running from the secondary partition.

4.1.2 Procedure SPIRE-FM-SFT-DRCU-ON-P

Version	2.3
Date	28th August 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 • SPIRE DRCU is switched OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	4 minutes
Pass/Fail Criteria	DRCU voltages show expected 'ON' values

Procedure steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/After	Actual Values Before/After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-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-SFT-DRCU-START-P-STEP2.tcl	—	—	—	Received two TC failure reports. Expected behaviour because TCs to stop nominal and critical HK reports were already executed in Step 1
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 SCUP9V - V SCUM9V - V BIASP5V -V BIASP9V - V BIASM9V - V	~ 5.2 ± 0.5 ~ 9.0 ± 0.2 ~ -9.0 ± 0.2 ~ 5.1 ± 0.5 ~ 9.0 ± 0.2 ~ -9.0 ± 0.2	5.24 9.08 -9.08 5.18 8.99 -9.05	✓ ✓ ✓ ✓ ✓ ✓

Test Result (Pass/Fail): Pass

4.1.3 Procedure SPIRE-FM-SFT-FUNC-SCU-01-P

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is 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-SFT-FUNC-SCU-01-P.tcl	SCUFRAMECNT TM5N	0/31 0x3FFF/1	**0/31** **0x3FFF/1**	✓ ✓ **TM5N is not on the SFT PARAMETERS display.** **It is present on the DPU & OBS PARAMETERS display.**
Test Result (Pass/Fail): Pass					

4.1.4 Procedure SPIRE-FM-SFT-FUNC-SCU-03-P

Version	2.3
Date	28th August 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 • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • 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* *: 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-SFT-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	**0/0xFFFF/0xFFFF**	✓
4	If the instrument is at He II temperatures check the values of SCU DC thermometry channels.	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	(All Values TBC) -/~4.6K -/~3.0K -/~3.0K -/~1.7K -/~4.6K -/~1.7K -/~1.7K -/~4.6K -/~4.6K -/~4.5K -/~4.6K -/~4.6K -/~4.6K -/~4.6K -/~4.6K -/~4.5K	**NA**	—

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
5	If the instrument is at He I temperatures check the values of SCU DC thermometry channels.	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	(All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.2K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.7K ~4.7K ~4.8K	**NA**	—
6	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW values of SCU DC thermometry channels.** Record the RAW values of SCU DC thermometry channels. Nominal values should show a short circuit status (or RAW -32768). **Non Nominal (Open Circuit Criterion): RAW reading in the range [0, -100]**	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	— — — — — — — — — — — — — — — —	**All values as expected except those indicated.** **-30459[a]** **+32768 → -32768[b]** **[a] c.f. WFT-2 -29820 – the variation is expected.** **[b] Raw value switches between**	✓

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
				0x7FFF and 0x8000.	
Test Result (Pass/Fail): Pass					

4.1.5 Procedure SPIRE-FM-SFT-FUNC-SCU-06-P

Version	2.3
Date	28th August 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 • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • 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-SFT-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	**0/1/1**	✓
4	If the instrument is at He II temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~1.7K	**NA**	—
5	If the instrument is at He I temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~4K	**NA**	—

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
6	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW value of SCU AC thermometry channel.** Only record the RAW value of SCU AC thermometry channel if it indicates an open circuit. **Open Circuit Criterion:** **RAW reading in the range [0, -100]**	SUBKTEMP	—	**32757/32750**	✓
Test Result (Pass/Fail): Pass					

Start time of test execution: 10:08 UT, 11th Feb 2008

4.1.6 Procedure SPIRE-FM-SFT-FUNC-SCU-07-P

Version	2.2
Date	2nd January 2007
Purpose	Sorption Cooler Heater Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-07-P.tcl	—	—	—	—
2	**Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk**	BBFULLTYPE	Cooler_Htr_Chk	**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	**0/324.44/0**	✓
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	**0/324.27/0**	✓
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	**0/8.8/0**	✓
Test Result (Pass/Fail): **Pass**					

4.1.7 Procedure SPIRE-FM-SFT-FUNC-SCU-04-P

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-SCU-04-P.tcl **The expected values during the test should be monitored when parameter BBFULLTYPE in the SFT PARAMETERS display is set to PCAL_Check This usually happens about 30 seconds from the start of test execution.**	PCALCURR - mA PCALV – V BBFULLTYPE	0.0/0.1/0.0 0.0/0.026/0.0 PCAL_Check	**0/0.1013/0** **0/0.0217/0**	✓ ✓
Test Result (Pass/Fail): Pass					

4.1.8 Procedure SPIRE-FM-SFT-FUNC-SCU-05-P

Version	2.3
Date	28th 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
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-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 SCAL4V – V	0.0/0.10/0.0 0.0/0.05/0.0	**0/0.1016/0** **0/0.0506/0**	✓ ✓
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 SCAL2V – V	0.0/0.10/0.0 0.0/0.05/0.0	**0/0.1020/0** **0/0.0506/0**	✓ ✓
Test Result (Pass/Fail): Pass					

4.1.9 Procedure SPIRE-FM-SFT-FUNC-MCU-01-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	MCU voltages and board temperatures show expected 'ON' values

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-MCU-01-P.tcl	—	—	—	—
2	Check that the MCU is booted up successfully	MCUBITSTAT	0/1/1	0/1/1	✓
3	Check MCU HK parameter values and ensure that the values are refreshing	MCUP5V MCUP14V MCUM14V MCUP15V MCUM15V MCUMACTEMP MCUSMECTEMP MCUBSMTEMP	~ 5.0 ± 0.2V ~ 14.0 ± 0.5V ~ -14.0 ± 0.5V ~ 15.0 ± 0.5V ~ -15.0 ± 0.7V ~300K ~300K ~300K	5.00V 14.15V -14.47V 15.54V -15.63V 291.56K 296.70K 296.35K	✓ ✓ ✓ Change limits in procedure
Test Result (Pass/Fail): Pass					

Procedure Steps for FM:

4.1.10 Procedure: SPIRE-FM-SFT-FUNC-MCU-02-P

Version	2.2
Date	2nd January 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-MCU-02-P.tcl	MCUFRAMECNT	**FM** : 0/297	0/297	✓
Test Result (Pass/Fail): **Pass**					

4.1.11 Procedure SPIRE-FM-SFT-FUNC-BSM-01-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 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-SFT-FUNC-BSM-01-P.tcl	—	—	—	—
2	Check that the Chop and Jiggle sensors have switched on	CHOPSENSPWR JIGGSENSPWR	0/1/1 0/1/1	**0/-/1** **0/-/1**	✓ ✓

Test Result (Pass/Fail): Pass

4.1.12 Procedure SPIRE-FM-SFT-BSM-OFF-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-BSM-OFF-P.tcl	—	—	—	—
2	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0	**1/-/0** **1/-/0**	✓ ✓
Test Result (Pass/Fail): Pass					

4.1.13 Procedure SPIRE-FM-SFT-FUNC-SMEC-01-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 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-SFT-FUNC-SMEC-01-P.tcl	—	—	—	—
2	Check that power to the SMEC LED and LVDT sensor is on	SMECENCPWR SMECLVDTPWR	0/-/1 0/-/1	**0/-/1** **0/-/1**	✓ Parameter missing from SFT PARAMETERS display. ✓
Test Result (Pass/Fail): **Pass**					

4.1.14 Procedure SPIRE-FM-SFT-SMEC-OFF-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-SMEC-OFF-P.tcl	—	—	—	—
2	Check that the power to the SMEC sensors is switched off	SMECENCPWR	1/-/0	**1/-/0**	✓ Parameter missing from SFT PARAMETERS display.
		SMECLVDTPWR	1/-/0	**1/-/0**	✓
Test Result (Pass/Fail): Pass					

4.1.15 Procedure SPIRE-FM-SFT-FUNC-DCU-01-P

Version	2.2
Date	2nd January 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
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-DCU-01-P.tcl	DCUFRAMECNT	0/700	**0/100**	**Fail**

Test Result (Pass/Fail): Fail – Script used was optimised for the AVM. It was corrected for both the PRIME and REDUNDANT side. Updated scripts (CVS version 1.2) for FM delivered to CCS. Test was successfully completed on REDUNDANT side with new script - see section 4.2.15

4.1.16 Procedure SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P

Version	2.4
Date	10th Sept 2007
Purpose	Photometer LIAs PRIME 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. Photometer LIAs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • Photometer LIAs are OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS & SFT PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected ON values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P.tcl	PLIABITSTAT	0/1/1	**0/-/1**	✓
2	Check Photometer LIA HK parameter values and ensure that the values are refreshing	PLIAP5V PLIAP9V PLIAM9V	0.0/-/ 5.2 ± 0.2V 0.0/-/ 11.5 ± 0.5V 0.0/-/-11.5 ± 0.5V	**0/ 5.23V** **0/ 11.58V** **0/-11.58V**	✓ ✓ ✓
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAP1TEMP to LIAP9TEMP	~ 290-300 K	**OK**	✓
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail): Pass					

4.1.17 Procedure SPIRE-FM-SFT-PLIA-OFF-P

Version	2.4
Date	10th Sept 2007
Purpose	Photometer LIAs 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. Photometer LIAs 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. Photometer LIAs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • Photometer LIAs are ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected OFF values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PLIA-OFF-P.tcl	PLIABITSTAT	1/-/0	**1/-/0**	✓
2	Check Photometer LIA HK parameter values	PLIAP5V PLIAP9V PLIAM9V	5.2 ± 0.2V/-/0.0 11.5 ± 0.5V/-/0.0 -11.5 ± 0.5V/-/0.0	**5.23V/0** **11.58V/0** **-11.58V/0**	✓ ✓ ✓
Test Result (Pass/Fail): Pass					

4.1.18 Procedure SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P

Version	2.4
Date	10th Sept 2007
Purpose	Spectrometer LIAs PRIME 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. Spectrometer LIAs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • Spectrometer LIAs are OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS & DCU PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected ON values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P.tcl	SLIABITSTAT	0/1/1	**0/-/1**	✓
2	Check Spectrometer LIA HK parameter values and ensure that the values are refreshing	SLIAP5V SLIAP9V SLIAM9V	0.0/-/ 5.2 ± 0.2V 0.0/-/ 11.5 ± 0.5V 0.0/-/-11.5 ± 0.5V	**0/ 5.25V** **0/ 11.58V** **0/-11.58V**	✓ ✓ ✓
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAS1TEMP to LIAS3TEMP	~ 290-300 K	**OK**	✓
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail): Pass					

4.1.19 Procedure SPIRE-FM-SFT-SLIA-OFF-P

Version	2.4
Date	10th Sept 2007
Purpose	Spectrometer LIAs 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. Spectrometer LIAs 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. Spectrometer LIAs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • Spectrometer LIAs are ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected OFF values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SLIA-OFF-P.tcl	SLIABITSTAT	1/-/0	**1/-/0**	✓
2	Check Photometer LIA HK parameter values	SLIAP5V SLIAP9V SLIAM9V	5.2 ± 0.2V/-/0.0 11.5 ± 0.5V/-/0.0 -11.5 ± 0.5V/-/0.0	**5.23V/0** **11.58V/0** **-11.58V/0**	✓ ✓ ✓
Test Result (Pass/Fail): Pass					

4.1.20 Procedure SPIRE-FM-SFT-MCU-OFF-P

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is ON. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-MCU-OFF-P.tcl	—	—	—	Typo in the script name. It should be SPIRE-FM-SFT-MCU-OFF-P.tcl
2	Check that the MCU is switched off	MCUBITSTAT	1/-/0	**1/-/0**	✓ The SFT procedure needs to be updated to include reference to TM(5,4) MCU Alarm report. The MODE gets set to SAFE by the DPU.
Test Result (Pass/Fail): **Pass**					

4.1.21 Procedure SPIRE-FM-SFT-SCU-OFF-P

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-SCU-OFF-P.tcl	—	—	—	Typo in the script name. It should be SPIRE-FM-SFT-SCU-OFF-P.tcl
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	FFFF/-/0	**FFFF/-/0**	✓
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0	**1/-/0**	✓
Test Result (Pass/Fail): Pass					

4.1.22 Procedure SPIRE-FM-SFT-DRCU-OFF-P

Version	2.2

Date	2nd January 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 .
Constraints	• SPIRE-FM-SFT-FUNC-SCU-OFF has been executed. • SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	THSK and TM2N stop refreshing/incrementing

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-DRCU-OFF.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): Pass					

4.1.23 Procedure SPIRE-FM-SFT-DPU-OFF-P

Version	2.2
Date	2nd January 2007

Purpose	DPU PRIME Switch OFF
Initial configuration	SPIRE DPU PRIME is ON but not generating HK.
Final configuration	SPIRE DPU PRIME is OFF.
Constraints	• SPIRE-FM-SFT-DRCU-OFF has been executed. • SPIRE DPU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT 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): Pass					

Prime side SFTs completed at 11:11 UT, 11th Feb 2008.

4.1.24 Procedure SPIRE-FM-SFT-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 • 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): Test not executed because of LPU LCL TM not available in the HPSDB.

4.2 REDUNDANT Instrument

4.2.1 Procedure SPIRE-FM-SFT-DPU-ON-R

Version	2.3
Date	28th August 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 • 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	Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively.

Procedure Steps for FM:

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-SFT-DPU-START-R-PP.tcl	—	—	—	
5	Check that Nominal and Critical HK packets are arriving at the CCS: **SPIRE Nominal HK:** • (type, subtype) : (3,25) • APID : 0x503 **SPIRE Critical HK:** • (type, subtype) : (3,25) • APID: 0x501				✓
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		✓
Test Result (Pass/Fail): Pass					

- Execution started at ~ 13:25 UT, 11th Feb 2008.
- The DPUM15V was within nominal limits at ~ -15.65±0.03V.
- OBS 2.2.G was running from the primary partition.

4.2.2 Procedure SPIRE-FM-SFT-DRCU-ON-R

Version	2.3
Date	28th August 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 • SPIRE DRCU is switched OFF • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	4 minutes
Pass/Fail Criteria	DRCU voltages show expected 'ON' values

Procedure steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/After	Actual Values Before/After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-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-SFT-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 SCUP9V - V SCUM9V - V BIASP5V - V BIASP9V - V BIASM9V - V	~ 5.2 ± 0.5 ~ 9.0 ± 0.2 ~ -9.0 ± 0.2 ~ 5.1 ± 0.5 ~ 9.0 ± 0.2 ~ -9.0 ± 0.2	5.23 9.09 -9.10 5.17 9.01 -9.06	✓ ✓ ✓ ✓ ✓ ✓
Test Result (Pass/Fail): Pass					

4.2.3 Procedure SPIRE-FM-SFT-FUNC-SCU-01-R

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is 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-SFT-FUNC-SCU-01-R.tcl	SCUFRAMECNT TM5N	0/31 0x3FFF/1	**0/31 0x3FFF/1**	✓ **TM5N is not on the SFT PARAMETERS display. It is present on the DPU & OBS PARAMETERS display. Change MIB.**
Test Result (Pass/Fail): Pass					

4.2.4 Procedure SPIRE-FM-SFT-FUNC-SCU-03-R

Version	2.3
Date	28th August 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 • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • 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* *: 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-SFT-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	**0/0xFFFF/0xFFFF**	✓
4	If the instrument is at He II temperatures check the values of SCU DC thermometry channels.	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP	(All Values TBC) -/~4.6K -/~3.0K -/~3.0K -/~1.7K -/~4.6K -/~1.7K -/~1.7K -/~4.6K -/~4.6K -/~4.5K -/~4.6K -/~4.6K -/~4.6K	**NA**	—

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
		SMECIFTEMP SMECTEMP BSMTEMP	-/~4.6K -/~4.6K -/~4.5K		
5	If the instrument is at He I temperatures check the values of SCU DC thermometry channels.	 PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	(All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.2K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.7K ~4.7K ~4.8K	**NA**	—
6	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW values of SCU DC thermometry channels.** Record the RAW values of SCU DC thermometry channels. Nominal values should show a short circuit status (or RAW -32768). **Non Nominal (Open Circuit Criterion): RAW reading in the range [0, -100]**	 PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	 — — — — — — — — — — — — — — — —	**All raw values at -32768, except those indicated.** **-30428**	✓
Test Result (Pass/Fail): Pass					

4.2.5 Procedure SPIRE-FM-SFT-FUNC-SCU-06-R

Version	2.3
Date	28th August 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 • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • 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-SFT-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	**0/1/1**	✓
4	If the instrument is at He II temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~1.7K	**NA**	—
5	If the instrument is at He I temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~4K	**NA**	—

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
6	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW value of SCU AC thermometry channel.** Only record the RAW value of SCU AC thermometry channel if it indicates an open circuit. **Open Circuit Criterion:** **RAW reading in the range [0, -100]**	SUBKTEMP	—		✓ **The raw value remains unchanged before and after AC thermometry switch-on.**
Test Result (Pass/Fail): Pass					

Comments: QLA is continuously reporting reception of unknown TM packets with the following characteristics:

APID: 12, Type: 3, Subtype: 26, SID, 0x579E

4.2.6 Procedure SPIRE-FM-SFT-FUNC-SCU-07-R

Version	2.2
Date	2nd January 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-07-R.tcl	—	—	—	—
2	**Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk**	BBFULLTYPE	Cooler_Htr_Chk	**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	**0/324.29/0**	✓
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	**0/325.47/0**	✓
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	**0/8.85/0**	✓

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
Test Result (Pass/Fail): Pass					

4.2.7 Procedure SPIRE-FM-SFT-FUNC-SCU-04-R

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-SCU-04-R.tcl **The expected values during the test should be monitored when parameter BBFULLTYPE in the SFT PARAMETERS display is set to PCAL_Check This usually happens about 30 seconds from the start of test execution.**	PCALCURR - mA PCALV – V BBFULLTYPE	0.0/0.1/0.0 0.0/0.026/0.0 PCAL_Check	**0/0.1008/0** **0/0.0201/0** **PCAL_Check**	✓ ✓ ✓
Test Result (Pass/Fail): Pass					

4.2.8 Procedure SPIRE-FM-SFT-FUNC-SCU-05-R

Version	2.2
Date	2nd January 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-SCU-05-R.tcl	—	—	—	
2	**Wait for the parameter BBFULLTYPE to get set to SCAL4_Check**	BBFULLTYPE	SCAL4_Check	**SCAL4_Check**	
3	A few seconds later record the value of parameters SCAL4CURR and SCAL4V *These parameters are set back to 0 after ~30 seconds*	SCAL4CURR – mA SCAL4V – V	0.0/0.10/0.0 0.0/0.05/0.0	**0/0.1017/0** **0/0.0507/0**	✓ ✓
4	**Wait for the parameter BBFULLTYPE to get set to SCAL2_Check**	BBFULLTYPE	SCAL2_Check	**SCAL2_Check**	
5	A few seconds later record the values of parameters SCAL2CURR and SCAL2V *These parameters are set back to 0 after ~30 seconds*	SCAL2CURR – mA SCAL2V – V	0.0/0.10/0.0 0.0/0.05/0.0	**0/0.1010/0** **0/0.0505/0**	✓ ✓
Test Result (Pass/Fail):					

4.2.9 Procedure SPIRE-FM-SFT-FUNC-MCU-01-R

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	MCU voltages and board temperatures show expected 'ON' values

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-MCU-01-R.tcl	—	—	—	—
2	Check that the MCU is booted up successfully	MCUBITSTAT	0/1/1	**0/1/1**	✓
3	Check MCU HK parameter values and ensure that the values are refreshing	MCUP5V - V MCUP14V -V MCUM14V - V MCUP15V - V MCUM15V - V MCUMACTEMP - K MCUSMECTEMP - K MCUBSMTEMP - K	~ 5.0 ± 0.2 ~ 14.0 ± 0.5 ~ -14.0 ± 0.5 ~ 15.0 ± 0.5 ~ -15.0 ± 0.7 ~300 ~300 ~300	**5.00** **14.12** **-14.49** **15.50** **-15.61** **292.17** **296.35** **296.35**	✓ ✓ ✓ Change limits in procedure ✓ ✓ ✓
Test Result (Pass/Fail): Pass					

Start time of test execution: 13:58 UT, 11th Feb 2008.

4.2.10 Procedure: SPIRE-FM-SFT-FUNC-MCU-02-R

Version	2.2
Date	2nd January 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.
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-MCU-02-R.tcl	MCUFRAMECNT	**FM** : 0/297	**0/297**	✓
Test Result (Pass/Fail): Pass					

Start time of test execution: 13:58 UT, 11th Feb 2008.

4.2.11 Procedure SPIRE-FM-SFT-FUNC-BSM-01-R

Version	2.3
Date	28th August 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.
Constraints	• 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 • SFT PARAMETERS display is selected on the CCS
Duration	3 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-SFT-FUNC-BSM-01-R.tcl	—	—	—	—
2	Check that the Chop and Jiggle sensors have switched on	CHOPSENSPWR JIGGSENSPWR	0/1/1 0/1/1	**0/-/1** **0/-/1**	✓ ✓
Test Result (Pass/Fail): Pass					

4.2.12 Procedure SPIRE-FM-SFT-BSM-OFF-R

Version	2.3
Date	28th August 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.
Constraints	• 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 • SFT 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-SFT-BSM-OFF-R.tcl	—	—	—	—
2	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0	**1/-/0** **1/-/0**	✓ ✓
Test Result (Pass/Fail): Pass					

4.2.13 Procedure SPIRE-FM-SFT-FUNC-SMEC-01-R

Version	2.3
Date	28th August 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.
Constraints	• 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 • SFT PARAMETERS display is selected on the CCS
Duration	3 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-SFT-FUNC-SMEC-01-R.tcl	—	—	—	—
2	Check that power to the SMEC LED and LVDT sensor is on	SMECENCPWR	0/-/1	**0/-/1**	✓ **Parameter missing from SFT PARAMETERS display. Change MIB.**
		SMECLVDTPWR	0/-/1	**0/-/1**	✓
Test Result (Pass/Fail):					

4.2.14 Procedure SPIRE-FM-SFT-SMEC-OFF-R

Version	2.3
Date	28th August 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.
Constraints	• 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 • SFT 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-SFT-SMEC-OFF-R.tcl	—	—	—	—
2	Check that the power to the SMEC sensors is switched off	SMECENCPWR	1/-/0	**1/-/0**	✓ **Parameter missing from SFT PARAMETERS display. Change MIB.**
		SMECLVDTPWR	1/-/0	**1/-/0**	✓
Test Result (Pass/Fail): Pass					

4.2.15 Procedure SPIRE-FM-SFT-FUNC-DCU-01-R

Version	2.2
Date	2nd January 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-DCU-01-R.tcl	DCUFRAMECNT	0/700	**0/700**	✓

Test Result (Pass/Fail): Pass – Used updated script for FM. (Note that the AVM script was used in error on the Prime side, see section 4.1.15)

4.2.16 Procedure SPIRE-FM-SFT-FUNC-DCU-04-PHOT-R

Version	2.4
Date	10th Sept 2007
Purpose	Photometer LIAs REDUNDANT 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. Photometer LIAs are ON
Constraints	• SPIRE DRCU REDUNDANT is switched ON • Photometer LIAs are OFF • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS & DCU PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected ON values

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-PHOT-R.tcl	PLIABITSTAT	0/1/1	**0/-/1**	✓
2	Check Photometer LIA HK parameter values and ensure that the values are refreshing	PLIAP5V - V PLIAP9V - V PLIAM9V - V	0.0-/ 5.2 ± 0.2 0.0/-/ 11.5 ± 0.5 0.0/-/-11.5 ± 0.5	**0/ 5.24** **0/ 11.59** **0/-11.57**	✓ ✓ ✓
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAP1TEMP to LIAP9TEMP - K	~ 290-300	**~294-295**	✓
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail): **Pass**					

Start time of test execution: 14:17 UT, 11th Feb 2008.

4.2.17 Procedure SPIRE-FM-SFT-PLIA-OFF-R

Version	2.4

Date	10th Sept 2007
Purpose	Photometer LIAs 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. Photometer LIAs 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. Photometer LIAs are OFF
Constraints	• SPIRE DRCU REDUNDANT is switched ON • Photometer LIAs are ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected OFF values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PLIA-OFF-R.tcl	PLIABITSTAT	1/-/0	**1/-/0**	✓
2	Check Photometer LIA HK parameter values	PLIAP5V - V PLIAP9V - V PLIAM9V - V	5.2 ± 0.2/-/0.0 11.5 ± 0.5/-/0.0 -11.5 ± 0.5/-/0.0	**5.23/0** **11.60/0** **-11.58/0**	✓ ✓ ✓
Test Result (Pass/Fail): Pass					

Start time of test execution: 14:17 UT, 11th Feb 2008.

4.2.18 Procedure SPIRE-FM-SFT-FUNC-DCU-04-SPEC-R

Version	2.4
Date	10th Sept 2007
Purpose	Spectrometer LIAs REDUNDANT 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. Spectrometer LIAs are ON
Constraints	• SPIRE DRCU REDUNDANT is switched ON • Spectrometer LIAs are OFF • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS & DCU PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected ON values

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-SPEC-R.tcl	SLIABITSTAT	0/1/1	**0/-/1**	✓
2	Check Spectrometer LIA HK parameter values and ensure that the values are refreshing	SLIAP5V - V	0.0/-/ 5.2 ± 0.2	**0/ 5.2518V**	✓ **In soft high limit. Change MIB.**
		SLIAP9V – V SLIAM9V - V	0.0/-/ 11.5 ± 0.5 0.0/-/-11.5 ± 0.5	**0/ 11.59V** **0/-11.57V**	✓ ✓
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAS1TEMP to LIAS3TEMP - K	~ 290-300	**~ 294-296**	✓
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail): Pass					

Start time of test execution: 14:24 UT, 11th Feb 2008.

4.2.19 Procedure SPIRE-FM-SFT-SLIA-OFF-R

Version	2.4
Date	10th Sept 2007
Purpose	Spectrometer LIAs 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. Spectrometer LIAs 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. Spectrometer LIAs are OFF
Constraints	• SPIRE DRCU REDUNDANT is switched ON • Spectrometer LIAs are ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected OFF values

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SLIA-OFF-R.tcl	SLIABITSTAT	1/-/0	**1/-/0**	✓
2	Check Photometer LIA HK parameter values	SLIAP5V - V SLIAP9V - V SLIAM9V - V	5.2 ± 0.2/-/0.0 11.5 ± 0.5/-/0.0 -11.5 ± 0.5/-/0.0	**5.2518** **11.59** **-11.57**	✓ ✓ ✓
Test Result (Pass/Fail): Pass – Change limits in MIB for SLIAP5V					

Start time of test execution: 14:29 UT, 11th Feb 2008.

4.2.20 Procedure SPIRE-FM-SFT-MCU-OFF-R

Version	2.3
Date	28th August 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.
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MCU REDUNDANT is ON. • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-MCU-OFF-R.tcl	—	—	—	Typo in the script name. It should be SPIRE-FM-SFT-MCU-OFF-R.tcl
2	Check that the MCU is switched off	MCUBITSTAT	1/-/0	**1/-/0**	✓ **Two event reports produced (as expected):** **1) TM(5,1) with Event ID 0x0521 and SID 0x510F – No MCU Response** **2) TM(5,4) with Event ID 0x550D and SID 0x5420.** **SPIRE goes from DRCU_ON mode (Raw 0x100) to SAFE mode (Raw 0x900).** **These are to be included in Issue 2.5 of SFT Proc 2494.**

Test Result (Pass/Fail): Pass

Start time of test execution: 14:31 UT, 11th Feb 2008.

4.2.21 Procedure SPIRE-FM-SFT-SCU-OFF-R

Version	2.3
Date	28th August 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
Constraints	• SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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-SFT-FUNC-SCU-OFF-R.tcl	—	—	—	Typo in the script name. It should be SPIRE-FM-SFT-SCU-OFF-P.tcl
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0xFFFF/-/0	**0xFFFF/-/0**	✓
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0	**1/-/0**	✓
Test Result (Pass/Fail): **Pass**					

4.2.22 Procedure SPIRE-FM-SFT-DRCU-OFF-R

Version	2.2
Date	2nd January 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 .
Constraints	• SPIRE-FM-SFT-FUNC-SCU-OFF has been executed. • SPIRE DRCU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	THSK and TM2N stop refreshing/incrementing

Procedure Steps for FM:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-DRCU-OFF.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): Pass					

Start time of test execution: 14:34 UT, 11th Feb 2008.

4.2.23 Procedure SPIRE-FM-SFT-DPU-OFF-R

Version	2.2
Date	2nd January 2007

Purpose	DPU REDUNDANT Switch OFF
Initial configuration	SPIRE DPU REDUNDANT is ON but not generating HK.
Final configuration	SPIRE DPU REDUNDANT is OFF.
Constraints	• SPIRE-FM-SFT-DRCU-OFF has been executed. • SPIRE DPU REDUNDANT is switched ON • SPIRE MIB REDUNDANT is imported in the CCS database. • CCS is up and running • SFT 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): Pass					

Redundant side SFTs completed at 14:35 UT, 11th Feb 2008.

4.2.24 Procedure SPIRE-FM-SFT-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 ±45º • 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): **Test not executed because of LPU LCL TM not available in the HPSDB.**