



Spire Procedure

SPIRE IST Cold Functional Test Procedures
A.A.Aramburu & Sunil D.Sidher

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1. INTRODUCTION

This document contains the SPIRE Cold Functional Test Procedures to be executed during the Herschel IST. These procedures are valid **for both He I and He II temperatures**

1.1 Purpose

The main purposes of this document are:

- To define a general pass fail criteria for overall test execution.
- To give detailed and comprehensive step-by-step instructions on how to perform each single test
- To estimate the duration of procedure based on individual test run times.

1.2 Scope

This procedure is intended to be used for the checkout of the functionality of all SPIRE subsystems cold during the IST **but can also be used during the AVM campaign as a tool to verify all relevant CCS templates**. The same templates will be used for both the AVM and the IST.

- Where deviations from the behaviour of the real instrument are expected (AVM), this is clearly identified by separate sequences within the actual procedure, i.e., ***Procedure Steps for IST:*** and ***Procedure Steps for AVM:*** are available.
- This procedure is applicable to both PRIME and REDUNDANT instrument.

1.3 Change Record

Issue 0.1, 27/04/2005 – Draft version for EQM

Issue 2.0, 12/06/2006 – First version for IST

Issue 2.1, 22/08/2006 – Several changes to Issue 2.0

1.4 Applicable Documents

AD01 SPIRE Functional Test Specification, Issue 1.4, SPIRE-RAL-DOC-001652, 22/07/2005

AD02 SPIRE ILT Cold Functional Test Procedure, Issue 1.1, SPIRE-RAL-PRC-002585, 22/03/2006

1.5 Reference Documents

RD01 SPIRE Instrument User Manual, Issue 1.0, SPIRE-RAL-PRJ-002395, 08/04/2005

1.6 Constrains

- Some procedures can only be run after integration of the SPIRE FPU with the Herschel Flight Cryostat– where appropriate this is clearly indicated in the preconditions section of each procedure
- For the SPIRE spectrometer mechanism (SMECm) tests it is assumed that the Herschel cryostat will be tilted (TBD).
- 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.
- **These procedures should be suitable for operation of both the Prime and Redundant side of the instrument (TBD).**
- **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.**



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- **The SPIRE thermometry channel values quoted in the procedures are dependent on the Herschel cryostat achieving nominal Level 0 and Level 1 temperature.**

1.7 Open Issues

- Names of the Herschel Satellite procedures for powering on/off the SPIRE DPU and DRCU are to be filled in the next version. In this version they are marked as procedure XXXXXX.

1.8 Duration

The estimated duration for executing the entire CFT sequence of procedures, including switch off of the SPIRE instrument afterwards is estimated to be about **4 hours**.



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2. COLD FUNCTIONAL TEST PROCEDURES

2.1 General instructions for executing test procedures

- Before executing any of the procedures please always check with the I-EGSE staff
- Any text in **boldface** in the procedural steps generally indicates an action which has to be performed manually by the Instrument EGSE (I-EGSE) staff.
- The procedures are listed here in the order in which they are expected to be performed.
- For these functional tests the instrument will not always be in a pre-defined mode as listed in the IUM (**RD01**).
- The procedure tables 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.

2.2 General Pass/Fail criterion

Consecutive failure of 2 executions of the same procedure is enough to declare the overall test result as failed. If the repetition of the procedure is successful this one should be repeated once again as a 'health' check. **In case of overall failure** [see section 3](#) of the document which addresses the safe switch OFF of the instrument under different scenarios.



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2.3 Detailed Procedures

2.3.1 Procedure SPIRE-IST-DPU-ON

Version: 1.0

Date: 12th June 2006

Purpose: To switch on the SPIRE DPU and start generating housekeeping

Duration: 2 minutes plus time to execute CCS procedure XXXXXX

Preconditions:

- Procedure to supply 28V Power Supply from the satellite to the SPIRE DPU is available
- SPIRE MIB is imported in the CCS database.
- CCS is up and running (SCOS, TOPE and the CDMU)
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS
- The I-EGSE is up and running

Initial Configuration: SPIRE Warm Electronics (DPU and DRCU) are switched off

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/Fail
1	Using CCS procedure XXXXX Power on the SPIRE DPU 28V Power Supply	—	—	—	
2	Wait for instruction from I-EGSE staff to continue with the procedure	—	—	—	
3	Execute TCL script SPIRE-IST-DPU-ON.tcl	—	—	—	
4	Check that THSK parameter is refreshing every second	—	—	—	
5	Check that TM2N parameter is incrementing every second	—	—	—	

Test Result (Pass/Fail):

Final Configuration: SPIRE DPU is on but the DRCU is still off



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2.3.2 Procedure SPIRE-IST-DRCU-ON

Version: 1.1

Date: 22nd August 2006

Purpose: To switch on the SPIRE DRCU and start generating housekeeping

Duration: 4 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched off
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps for IST ONLY:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/Failure
1	Execute TCL script SPIRE-IST-DRCU-ON-STEP1.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	—	—	—	
3	Check that TM2N parameter is not incrementing anymore	—	—	—	
4	When instructed by the I-EGSE staff Power on the SPIRE DRCU using the CCS procedure XXXXXX	—	—	—	
5	Execute TCL script SPIRE-IST-DRCU-ON-STEP2.tcl	—	—	—	
6	Check that THSK parameter is again refreshing every 4 seconds	—	—	—	
7	Check that TM2N parameter is again incrementing every 4 seconds	—	—	—	

Test Result (Pass/Fail):



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Procedure Steps for AVM ONLY:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/Failure
1	Execute TCL script SPIRE-IST-DRCU-ON-STEP1.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	—	—	—	
3	Check that TM2N parameter is not incrementing anymore	—	—	—	
4	Start DRCU simulator application software.	—	—	—	
5	Execute TCL script SPIRE-IST-DRCU-ON-STEP2.tcl Note: At this moment two HK parameters BIASTEMP and DAQTEMP will go Out Of limits (Hard Limits). This is an inherent feature of the DRCU simulator which cannot be avoided.	BIASTEMP DAQTEMP	—	OOL	
6	Check that THSK parameter is again refreshing every 4 seconds	—	—	—	
7	Check that TM2N parameter is again incrementing every 4 seconds	—	—	—	

Test Result (Pass/Fail):

Final Configuration:

- SPIRE DPU and DRCU are both on
- HK generation is on



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2.3.3 Procedure SPIRE-IST-FUNC-SCU-02

Version: 1.0

Date: 12th June 2006

Purpose: SCU science contents check by the I-EGSE

Duration: 5 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS
- DPU AND OBS PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-02.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):

Final Configuration: Unchanged



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2.3.4 Procedure SPIRE-IST-FUNC-SCU-03

Version: 1.0

Date: 21st June 2006

Purpose: SCU DC thermometry check

Duration: 6 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-03.tcl	—	—	—	
2	Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm	BBFULLTYPE	- /SCU_DC_Therm/ -		
3	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0/0xFFFF/0xFFFF		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: SCU DC thermometry is switched on.



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2.3.5 Procedure SPIRE-IST-FUNC-SCU-06

Version: 1.0

Date: 12th June 2006

Purpose: SCU AC thermometry check

Duration: 2 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-06.tcl	—	—	—	
2	Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm	BBFULLTYPE	- /SCU_AC_Therm /-		
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	0/1/1		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: SCU AC thermometry is switched on.



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2.3.6 Procedure SPIRE-IST-FUNC-SCU-07

Version: 1.1

Date: 22nd August 2005

Purpose: SCU cooler heaters check

Duration: 3 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS



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Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-07.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. <i>This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.</i>	SPHSV - mV	0/~323/0		
4	Record the value of parameter EVHSV – the Evaporator Heat Switch Voltage. <i>This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.</i>	EVHSV - mV	0/~323/0		
5	Record the value of parameter SPHTRV – the Sorption Pump Heater Voltage. <i>This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.</i>	SPHTRV - V	0/~8.8/0		
6	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: Unchanged



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2.3.7 Procedure SPIRE-IST-FUNC-SCU-04

Version: 1.0

Date: 12th June 2006

Purpose: SCU PCAL check

Duration: 2 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter Name - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-04.tcl 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 PCALV – V BBFULLTYPE	0.0/0.1/0.0 0.0/0.026/0.0 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



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2.3.8 Procedure SPIRE-IST-FUNC-PCAL-01

Version: 1.0

Date: 12th June 2006

Purpose: SCU PCAL characterisation

Duration: 8 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

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

Final Configuration: Unchanged



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2.3.9 Procedure SPIRE-IST-FUNC-SCU-05

Version: 1.0

Date: 21st June 2006

Purpose: SCU Spectrometer SCAL4 and SCAL2 check

Duration: 4 minutes

Preconditions: SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-SCU-05.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 <i>These parameters are set back to 0 after ~30 seconds</i>	SCAL4CURR – mA SCAL4V – V	0.0/0.10/0.0 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 <i>These parameters are set back to 0 after ~30 seconds</i>	SCAL2CURR – mA SCAL2V – V	0.0/0.10/0.0 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):					

Final Configuration: Unchanged



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2.3.10 Procedure SPIRE-IST-FUNC-SCAL-01

Version: 1.0

Date: 12th June 2006

Purpose: SCU SCAL4 and SCAL2 characterisation

Duration: 16 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

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

Final Configuration: Unchanged



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2.3.11 Procedure SPIRE-IST-FUNC-MCU-01

Version: 1.0

Date: 12th June 2006

Purpose: To boot up the MCU

Duration: 3 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is DRCU_ON	MODE	DRCU_ON		
2	Execute TCL script SPIRE-IST-FUNC-MCU-01.tcl	—	—	—	
3	Check that the mode parameter is REDY	MODE	DRCU_ON/-/REDY		
4	Check that the MCU is booted up successfully	MCUBITSTAT	0/1/1		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration:

- MCU is switched on and booted up
- SPIRE is in REDY mode



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2.3.12 Procedure: SPIRE-IST-FUNC-MCU-03

Version: 1.0

Date: 12th June 2006

Purpose: MCU science data contents check

Duration: 5 minutes

Preconditions:

- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-MCU-03.tcl	—	—	—	—
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: Unchanged



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2.3.13 Procedure SPIRE-IST-FUNC-BSM-01

Version: 1.0

Date: 12th June 2006

Purpose: BSM switch on check

Duration: 3 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-BSM-01.tcl	—	—	—	
3	Check that the Chop and Jiggle sensors have switched on	CHOPSENSPWR JIGGSENSPWR	0/1/1 0/1/1		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: BSM is switched on.



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2.3.14 Procedure SPIRE-IST-FUNC-BSM-03

Version: 1.0

Date: 12th June 2006

Purpose: BSM open loop dynamics check

Duration: 6 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-BSM-03.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.15 Procedure SPIRE-IST-FUNC-BSM-05a

Version: 1.0

Date: 12th June 2006

Purpose: BSM open loop chop test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-BSM-05a.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.16 Procedure SPIRE-IST-FUNC-BSM-05b

Version: 1.0

Date: 12th June 2006

Purpose: BSM closed loop chop test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute SPIRE-IST-BSM-INIT.tcl	MODE	REDY/- /PHOTSTBY		
3	Execute TCL script SPIRE-IST-FUNC-BSM-03.tcl	—	—		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.17 Procedure SPIRE-IST-BSM-OFF

Version: 1.0

Date: 12th June 2006

Purpose: Switch off the BSM

Duration: 2 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	PHOTSTBY		
2	Execute SPIRE-IST-BSM-OFF.tcl	MODE	PHOTSTBY/- /REDY	—	
3	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: BSM is switched off.



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2.3.18 Procedure SPIRE-IST-FUNC-SMEC-02a

Version: 1.0

Date: 12th June 2006

Purpose: Open the SMECm launch latch

Duration: 5 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-02a.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: SMECm is unlatched.



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2.3.19 Procedure SPIRE-IST-FUNC-SMEC-01

Version: 1.1

Date: 22nd August 2006

Purpose: SMECm switch on check

Duration: 5 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	IEGSE Staff: Change the correspondent default parameter of the Mode_SMECFunc01 CUS mode from "warm" to "cold"	—	—	—	
3	Execute TCL script SPIRE-IST-FUNC-SMEC-01.tcl	—	—	—	
4	Check that power to the SMEC LED and LVDT sensor is on	SMECENC_PWR SMECLVDT_PWR	0/-/4 0/1/1		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: SMECm is switched on.



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2.3.20 Procedure SPIRE-IST-FUNC-SMEC-03

Version: 1.0

Date: 12th June 2006

Purpose: SMEC LED Optical Encoder LED Check

Duration: 5 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-03.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: Unchanged



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2.3.21 Procedure SPIRE-IST-FUNC-SMEC-04a

Version: 1.0

Date: 12th June 2006

Purpose: SMECm open loop position test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-04a.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.22 Procedure SPIRE-IST-FUNC-SMEC-09

Version: 1.0

Date: 12th June 2006

Purpose: SMECm open loop scan test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Check the SMECm is in open loop	SMECLOOPMODE	6/6/6		
3	Execute TCL script SPIRE-IST-FUNC-SMEC-09 .tcl	—	—	—	
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.23 Procedure SPIRE-IST-FUNC-SMEC-04b

Version: 1.1

Date: 22nd August 2006

Purpose: SMECm closed loop position test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-INIT.tcl	SMECLOOPMODE MODE	6/1/1 REDY/- /SPECSTBY		
3	Execute TCL script SPIRE-IST-FUNC-SMEC-04B.tcl	—	—	—	
4	Check that SMECm is still in closed loop	SMECLOOPMODE	1		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: The SMECm is in closed loop.



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2.3.24 Procedure SPIRE-IST-FUNC-SMEC-07

Version: 1.1

Date: 22nd August 2006

Purpose: SMECm closed loop scan test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	SPECSTBY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-INIT.tcl	SMECLOOPMODE	-1/1		
3	Execute TCL script SPIRE-IST-FUNC-SMEC-07.tcl	—	—	—	
4	Check that SMECm is still in closed loop	SMECLOOPMODE	1		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.25 Procedure SPIRE-IST-FUNC-SMEC-06

Version: 1.1

Date: 22nd August 2006

Purpose: SMECm saw-tooth test

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	SPECSTBY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-INIT.tcl	SMECLOOPMODE	-1/1		
3	Execute TCL script SPIRE-IST-FUNC-SMEC-06.tcl	—	—	—	
4	Check that SMECm is still in closed loop	SMECLOOPMODE	1		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: Unchanged



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2.3.26 Procedure SPIRE-IST-SMEC-OFF

Version: 1.1

Date: 22nd August 2006

Purpose: Switch off the SMEC

Duration: 2 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	SPECSTBY		
2	Execute SPIRE-IST-SMEC-OFF.tcl	—	—	—	
3	Check that the power to the SMEC sensors is switched off	SMECENCPWR SMECLVDTPWR	4(TBD)/-/0 1/-/0		
4	Check that the mode parameter is REDY	MODE	REDY		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—			

Test Result (Pass/Fail):

Final Configuration: SMECm is switched off.



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2.3.27 Procedure SPIRE-IST-FUNC-SMEC-02b

Version: 1.0

Date: 12th June 2006

Purpose: Close the SMECm launch latch

Duration: 2 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute TCL script SPIRE-IST-FUNC-SMEC-02b.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: SMECm is latched.



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2.3.28 Procedure SPIRE-IST-FUNC-DCU-01

Version: 1.1

Date: 22nd August 2006

Purpose: DCU science packet generation check for all Photometer and Spectrometer packet types (PF, PSW, PMW, PLW, SF, SSW and SLW)

Duration: 5 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-01.tcl	DCUFRAMECNT	n/n+700		

Test Result (Pass/Fail):

Final Configuration: Unchanged

Remark:

n is an unknown number that depends on the execution of previous (BSM) sequences. The importance here is that actual difference before and after has to be 700 DCU frames



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2.3.29 Procedure SPIRE-IST-FUNC-DCU-11-P

Version: 1.0

Date: 12th June 2006

Purpose: Photometer detectors switch on

Duration: 10 minutes

Preconditions:

- SPIRE FM is electrically integrated with the Herschel Satellite

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-13-P.tcl	—	—	—	
2	Check that the Photometer detectors are switched on	PSWJFETSTAT PMLWJFETSTAT PSWJFET1V PSWJFET2V PSWJFET3V PSWJFET4V PSWJFET5V PSWJFET6V PMWJFET1V PMWJFET2V PMWJFET3V PMWJFET4V PLWJFET1V PLWJFET2V TCJFETV PHOTHTRV PLIABITSTAT	0/0x3F/0x3F 0/-/0x7F -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V -1.49V 0.0V 1		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					



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Final Configuration: Photometer detectors are switched on.



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2.3.30 Procedure SPIRE-IST-FUNC-DCU-13-P

Version: 1.0

Date: 12th June 2006

Purpose: Perform a Photometer Load Curve

Duration: 20 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **Procedure SPIRE-IST-FUNC-DCU-11-P has been executed**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- The Photometer detectors and LIAs are on
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Photometer LIAs are switched on	PLIABITSTAT	1		
2	Execute TCL script SPIRE-IST-FUNC-DCU-13-P.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.31 Procedure SPIRE-IST-PDET-OFF

Version: 1.0

Date: 12th June 2006

Purpose: Switch off photometer detectors

Duration: 2 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **SPIRE-IST-FUNC-DCU-11-P has been executed**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- Photometer detectors and LIAs are switched on
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS



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2.3.32 Procedure SPIRE-IST-FUNC-DCU-11-S

Version: 1.0

Date: 22nd August 2006

Purpose: Spectrometer detectors switch on

Duration: 10 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-11-S.tcl	—	—	—	
2	Check that the Spectrometer detectors are switched on	SPECJFETSTAT SSWJFET1V SSWJFET2V SLWJFET1V SPECHTRV SLIABITSTAT	0/7/7 -1.49V -1.49V -1.49V 0.0V 1		
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: Spectrometer detectors switched on.



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2.3.33 Procedure SPIRE-IST-FUNC-DCU-13-S

Version: 1.0

Date: 15th June 2006

Purpose: Perform a Spectrometer Load Curve

Duration: 20 minutes

Preconditions:

- SPIRE FM is electrically integrated with the Herschel Satellite
- Procedure SPIRE-IST-FUNC-DCU-11-S has been executed

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- Spectrometer detectors and LIAs are switched on
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Spectrometer LIAs are switched on	SLIABITSTAT	1		
2	Execute TCL script SPIRE-IST-FUNC-DCU-13-S.tcl	—	—	—	
3	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—

Test Result (Pass/Fail):

Final Configuration: Unchanged



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2.3.34 Procedure SPIRE-IST-SDET-OFF

Version: 1.0

Date: 12th June 2006

Purpose: Switch off Spectrometer detectors

Duration: 2 minutes

Preconditions:

- **SPIRE FM is electrically integrated with the Herschel Satellite**
- **Procedure SPIRE-IST-FUNC-DCU-11-S has been executed**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- Spectrometer detectors and LIAs are switched on
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-SDET-OFF.tcl	—	—	—	
2	Check that the Spectrometer detectors are switched off	SPECJFETSTAT SSWJFET1V SSWJFET2V SLWJFET1V SPECHTRV	7/-/0 0.0V 0.0V 0.0V 0.0V		
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):

Final Configuration: Spectrometer detectors are switched off.



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2.3.35 Procedure SPIRE-IST-MCU-OFF

Version: 1.0

Date: 12th June 2006

Purpose: Switch off the MCU – if necessary

Duration: 2 minutes

Preconditions:

- **SPIRE is in REDY mode**

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SPIRE FUNCTIONAL PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the mode parameter is REDY	MODE	REDY		
2	Execute SPIRE-IST-MCU-OFF.tcl	—	—	—	
3	Check that the MCU is switched off	MCUBITSTAT	1/-/0		
4	Wait for the I-EGSE staff to confirm the success or failure of this test	—			

Test Result (Pass/Fail):

Final Configuration: MCU switched off.



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2.3.36 Procedure SPIRE-IST-SCU-OFF

Version: 1.1

Date: 12th June 2006

Purpose: Switch off SCU DC and AC thermometry – if necessary

Duration: 2 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-SCU-OFF.tcl	—	—	—	
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	FFFF/-/0		
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0		
4	Check that SPIRE is in DRCU_ON mode	MODE	REDY/-/DRCU_ON		
5	Wait for the I-EGSE staff to confirm the success or failure of this test	—	—	—	—
Test Result (Pass/Fail):					

Final Configuration: SPIRE in DRCU_ON mode.



Spire Procedure

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2.3.37 Procedure SPIRE-IST-DRCU-OFF

Version: 1.1

Date: 22nd August 2006

Purpose: Switch off the DRCU

Preconditions:

- Procedure SPIRE-IST-SCU-OFF has been successfully executed
- SPIRE is electrically integrated with the Herschel FM.

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- FUNCTIONAL TEST PARAMETERS display is selected on the CCS

Procedure Steps for IST ONLY:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-DRCU-OFF.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	—	—	—	
3	Check that TM2N parameter is not incrementing anymore	—	—	—	
4	When instructed by the I-EGSE staff Power off the SPIRE DRCU using CCS procedure XXXXXX	—	—	—	

Test Result (Pass/Fail):



Spire Procedure

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Procedure Steps for AVM ONLY:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-DRCU-OFF.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	—	—	—	
3	Check that TM2N parameter is not incrementing anymore	—	—	—	
4	IEGSE staff: Stop DRCU Simulator application software	—	—	—	
Test Result (Pass/Fail):					

Final Configuration:

- DRCU is switched off
- SPIRE DPU is on but not generating HK



2.3.38 Procedure SPIRE-IST-DPU-OFF

Version: 1.0

Date: 12th June 2006

Purpose: Switch off the DPU – if necessary

Duration: 2 minutes

Preconditions: SPIRE-IST-DRCU-OFF has been successfully executed.

Initial Configuration:

- SPIRE DPU is on *but not* generating any HK
- DRCU is switched OFF

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	When instructed by the I-EGSE staff Power off the SPIRE DRCU using the CCS procedure XXXXXX	—	—	—	

Test Result (Pass/Fail):

Final Configuration: SPIRE DPU is switched off and the SPIRE instrument is OFF.



Spire Procedure

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3. Safe switch off

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

Procedure: SPIRE-SAFE-SWITCH-OFF

Version: 1.0

Date: 21st August 2006

Purpose: Switch off SPIRE

Preconditions: DPU AND OBS PARAMETERS SCOS display on MON1 task must be selected

Initial Configuration: SPIRE can be in any instrument configuration.

Procedure Steps:

Procedure Steps:

Step	Description	Parameter - Unit		Current value	Success/Failure
1	Check the current instrument configuration	MODE			
2	Case MODE 1: PHOTSBY → Go to step 3 2: SPECSTBY → Go to step 4 3: REDY → Go to step 5 4: DRCU_ON → Go to step 6				
3	Execute Procedures: ▪ 2.3.21 ▪ 2.3.37				
4	Execute Procedures: ▪ 2.3.30 ▪ 2.3.41				
5	Execute Procedure: ▪ 2.3.42				
6	Execute Procedure: ▪ 2.3.44				
7	Execute Procedure: ▪ 2.3.45				

Final Configuration: SPIRE is OFF