



## Spire Procedure

SPIRE IST ShortFunctional Test Procedures  
A.A.Aramburu & Sunil D.Sidher

<b>Ref:</b>	SPIRE-RAL-PRC-2494
<b>Issue:</b>	2.1
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## 1.INTRODUCTION

This document describes the Short Functional Test (SFT) procedures to be executed on the SPIRE FM Instrument during IST in the absence of the I-EGSE staff. **All the procedures in this document can be run with the instrument either warm or cold (He I and He II conditions).**

The appendices at the end include nominal switch on and switch off sequences for the SPIRE instrument and a safe switch off procedure in case of anomaly.

### 1.1Purpose

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.

### 1.2Scope

This procedure is intended to be used for the checkout of the basic functionality of all SPIRE subsystems 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.

### 1.3Change Record

Issue 1.0, 15/08/2005 – First version.

Issue 1.1, 08/09/2005

- Updates to make the procedure valid for both warm and cold conditions (He I and He II)
- SFTs updated and enhanced following completion of SFTs on 22/08/2005
- Inclusion of sequences for switching on *to* and switching off *from* standby mode

Issue 1.2, 15/09/2005

- Changed SPIRE switch-on procedure for standby mode to generate nominal housekeeping every 4 seconds.

Issue 1.3, 23/09/2005

- Changed the expected value of TM5N parameter before execution of test procedure SPIRE-IST-SFT-FUNC-SCU-01.

Issue 2.0, 13/06/2006

- IST version

Issue 2.1 22/08/2006

- Several Changes to Issue 2.0

### 1.4Applicable Documents

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

**AD02** SPIRE ILT Warm Functional Test Procedure, Issue 1.2, SPIRE-RAL-PRC-002322, 27/01/2006



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### 1.5Reference Documents

**RD01** SPIRE Warm Functional Test Procedures for the CCS, SPIRE-RAL-PRC-002422, Issue 1.4, 15/07/2005

**RD02** SPIRE 3<sup>rd</sup> Warm Functional Test Report, HP-2-ASED-TR-0077\_1\_0, Issue 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, Issue 1.0, SPIRE-RAL-PRJ-002395, 08/04/2005

### 1.6Constrains

- 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.

### 1.7Open 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.

### 1.8Duration

The estimated duration for executing the entire SFT sequence of procedures, including switch off of the SPIRE instrument afterwards is estimated to be about **1 hour and 20 minutes**.



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## 2.SHORT FUNCTIONAL TEST PROCEDURES

### 2.1General 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 (**RD04**).
- 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.

### 2.2General 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 5](#) of the document which addresses the safe switch OFF of the instrument under different scenarios.



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## 2.3 Detailed Test Procedures

### 2.3.1 Procedure SPIRE-IST-DPU-ON

**Version: 1.0**

**Date: 12<sup>th</sup> June 2006**

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

**Duration: 2 minutes**

**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 Simulator)
- SFT PARAMETERS display is selected on the CCS

**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	Execute TCL script SPIRE-IST-DPU-START.tcl	MODE	-/-/DPU_ON	—	
3	Check that THSK parameter is refreshing every second	—	—	—	
4	Check that TM2N parameter is incrementing every second	—	—	—	

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

**Final Configuration:**

- SPIRE is in DPU\_ON mode



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### 2.3.2 Procedure SPIRE-IST-DRCU-ON

**Version:** 1.1

**Date:** 22<sup>nd</sup> 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	<b>When instructed by the I-EGSE staff Power on the SPIRE DRCU using the CCS procedure XXXXXX</b>	—	—	—	
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	—	—	—	
<b>Test Result (Pass/Fail):</b>					



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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 <b>Note:</b> 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	—	—	—	
<b>Test Result (Pass/Fail):</b>					

### 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-01

**Version:** 1.0

**Date:** 12<sup>th</sup> June 2006

**Purpose:** SCU science packet generation check

**Duration:** 2 minutes

**Preconditions:** None

**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-01.tcl	SCUFRAMECNT TM5N	0/31 3FFF/1		

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

**Final Configuration:** Unchanged





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### 2.3.4 Procedure SPIRE-IST-FUNC-SCU-03

**Version: 1.0**

**Date: 12<sup>th</sup> 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
- SFT PARAMETERS display is selected on the CCS

**Final Configuration:** SCU DC thermometry is switched on.

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	<b>Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm</b>				
3	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0/FFFF/FFFF		
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		
5	If the instrument is at He I temperatures check the values of SCU DC thermometry channels.	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP	(All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K		

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Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
		SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	~4.2K ~4.2K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.7K ~4.7K ~4.8K		
6	<p>If the instrument is warm, record the values of SCU DC thermometry channels which are open circuit.</p> <p><b>Open Circuit Criterion: RAW reading in the range [0, -100]</b></p>	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	— — — — — — — — — — — — — — — —		
<b>Test Result (Pass/Fail):</b>					



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### 2.3.5 Procedure SPIRE-IST-FUNC-SCU-06

**Version: 1.0**

**Date: 12<sup>th</sup> 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
- SFT PARAMETERS display is selected on the CCS

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	<b>Wait for the parameter BBFULLTYPE to get set to SCU AC Therm</b>				
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	0/1/1		
4	If the instrument is at He II temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~1.7K		
5	If the instrument is at He I temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~4K		
6	If the instrument is warm, only record the values of SCU AC thermometry channel if it indicates an open circuit.  <b>Open Circuit Criterion: RAW reading in the range [0, -100]</b>	SUBKTEMP	—		
<b>Test Result (Pass/Fail):</b>					

**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: 22<sup>nd</sup> 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

**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	<b>Wait for the parameter BBFULLTYPE to get set to Cooler Htr Chk</b>	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	<b>Wait for the I-EGSE staff to confirm the success or failure of this test</b>	—	—	—	—
<b>Test Result (Pass/Fail):</b>					

**Final Configuration: Unchanged**



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### 2.3.7 Procedure SPIRE-IST-FUNC-SCU-04

**Version: 1.0**

**Date: 12<sup>th</sup> June 2006**

**Purpose: SCU Photometer 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
- SFT PARAMETERS display is selected on the CCS

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  <b>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.</b>	PCALCURR - mA PCALV – V  BBFULLTYPE	0.0/0.1/0.0 0.0/0.026/0.0  PCAL_Check		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration: Unchanged**



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### 2.3.8 Procedure SPIRE-IST-FUNC-SCU-05

**Version:** 1.0

**Date:** 21<sup>st</sup> 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
- SFT PARAMETERS display is selected on the CCS

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	<b>Wait for the parameter BBFULLTYPE to get set to SCAL4 Check</b>	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	<b>Wait for the parameter BBFULLTYPE to get set to SCAL2 Check</b>	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		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** Unchanged



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### 2.3.9 Procedure SPIRE-IST-FUNC-MCU-01

**Version:** 1.0

**Date:** 12<sup>th</sup> June 2006

**Purpose:** To boot up the MCU

**Duration:** 5 minutes

#### Preconditions:

#### Initial Configuration:

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

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	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	Check MCU HK parameter values and ensure that the values are refreshing	MCUP5V MCUP14V MCUM14V MCUP15V MCUM15V  MCUMACTEMP MCUSMECTEMP MCUBSMTEMP	~5.0V ~14.5V ~-14.5V ~15.5V ~-15.5V  ~300K ~300K ~300K		

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

#### Final Configuration:

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



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### 2.3.10Procedure: SPIRE-IST-FUNC-MCU-02

**Version: 1.0**

**Date: 12<sup>th</sup> June 2006**

**Purpose: MCU science data generation 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

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	REDY	
2	Execute TCL script SPIRE-IST-FUNC-MCU-02.tcl	—	—	—	—
3	Record the values of MCUFRAMECNT at the start and end of the test	MCUFRAMECNT	—		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** Unchanged





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### 2.3.11 Procedure SPIRE-IST-FUNC-BSM-01

**Version:** 1.0

**Date:** 12<sup>th</sup> 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

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	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		

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

**Final Configuration:** BSM is switched on.



## Spire Procedure

SPIRE IST ShortFunctional Test Procedures  
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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.12Procedure SPIRE-IST-BSM-OFF

**Version:** 1.0

**Date:** 12<sup>th</sup> 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

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	REDY	
2	Execute SPIRE-IST-BSM-OFF.tcl	—	—	—	—
3	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** BSM is switched off.



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.13 Procedure SPIRE-IST-FUNC-SMEC-01

**Version:** 1.0

**Date:** 12<sup>th</sup> June 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

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	REDY	
2	Execute TCL script SPIRE-IST-FUNC-SMEC-01.tcl	—	—	—	—
3	Check that power to the SMEC LED and LVDT sensor is on	SMECENCPWR SMECLVDT PWR	0/-/4(TBD) 0/1/1		

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

**Final Configuration:** SMECm is switched on.



## Spire Procedure

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A.A.Aramburu & Sunil D.Sidher

**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.14 Procedure SPIRE-IST-SMEC-OFF

**Version:** 1.0

**Date:** 12<sup>th</sup> June 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

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	REDY	
2	Execute SPIRE-IST-SMEC-OFF.tcl	—	—	—	—
3	Check that the power to the SMEC sensors is switched off	SMECENC PWR SMECLVDTPWR	4(TBD)/-/0 1/-/0		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** SMECm is switched off.



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.15 Procedure SPIRE-IST-FUNC-DCU-01

**Version:** 1.0

**Date:** 12<sup>th</sup> June 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
- SFT PARAMETERS display is selected on the CCS

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-01.tcl	DCUFRAMECNT	0/700		

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

**Final Configuration:** Unchanged



## Spire Procedure

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### 2.3.16Procedure SPIRE-IST-FUNC-DCU-04-P

**Version: 1.1**

**Date: 22<sup>nd</sup> August 2006**

**Purpose: Photometer LIAs switch on**

**Duration: 5 minutes**

**Preconditions: The Photometer LIAs are switched off**

**Initial Configuration:**

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

**Procedure Steps for IST ONLY:**



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-04-P.tcl	PLIABITSTAT	0/1/1		
2	Check Photometer LIA HK parameter values and ensure that the values are refreshing	PLIAP5V PLIAP9V PLIAM9V	-/~5.2V -/~11.5V -/~11.5V		
<b>Test Result (Pass/Fail):</b>					

### Procedure Steps for AVM ONLY:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-04-P.tcl	PLIABITSTAT	0/1/1		
2	<b>Note:</b> When the command to switch ON Photometer LIAs is sent to the DRCU simulator ALL photometer LIA related HK parameters will go Out of Limits (Hard Limits). This is an inherent feature of the DRCU simulator which cannot be avoided.	PLIAP5V PLIAP9V PLIAM9V LIAP9TEMP LIAP8TEMP LIAP7TEMP LIAP6TEMP LIAP5TEMP LIAP4TEMP LIAP3TEMP LIAP2TEMP LIAP1TEMP	OOL OOL OOL OOL OOL OOL OOL OOL OOL OOL OOL OOL		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** The Photometer LIAs are on.



## Spire Procedure

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### 2.3.17Procedure SPIRE-IST-PLIA-OFF

**Version: 1.1**

**Date: 22<sup>nd</sup> August 2006**

**Purpose: Photometer LIAs switch off**

**Duration: 5 minutes**

**Preconditions:**

- **SPIRE is in REDY mode**
- **The Photometer LIAs are switched on**

**Initial Configuration:**

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

**Procedure Steps for IST ONLY:**





## Spire Procedure

SPIRE IST ShortFunctional Test Procedures  
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<b>Ref:</b>	SPIRE-RAL-PRC-2494
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Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Check that SPIRE is in REDY mode	MODE	REDY		
2	Execute TCL script SPIRE-IST-PLIA-OFF.tcl	PLIABITSTAT	1/-/0		
3	Check Photometer LIA HK parameter values	PLIAP5V PLIAP9V PLIAM9V	~5.2/-/0.0V ~11.5/-/0.0V ~-11.5/-/0.0V		
<b>Test Result (Pass/Fail):</b>					

### Procedure Steps for AVM ONLY:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Check that SPIRE is in REDY mode	MODE	REDY		
2	Execute TCL script SPIRE-IST-PLIA-OFF.tcl	PLIABITSTAT	1/-/0		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** The Photometer LIAs are off.



## Spire Procedure

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<b>Ref:</b>	SPIRE-RAL-PRC-2494
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### 2.3.18Procedure SPIRE-IST-FUNC-DCU-04-S

**Version: 1.1**

**Date: 22<sup>nd</sup> August 2006**

**Purpose: Spectrometer LIAs switch on**

**Duration: 5 minutes**

**Preconditions: The Spectrometer LIAs are switched off**

**Initial Configuration:**

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

**Procedure Steps for IST ONLY:**



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-04-S.tcl	SLIABITSTAT	0/1/1		
2	Check Spectrometer LIA HK parameter values and ensure that the values are refreshing	SLIAP5V SLIAP9V SLIAM9V	-/~5.2V -/~11.5V -/~11.5V		
<b>Test Result (Pass/Fail):</b>					

### Procedure Steps for AVM ONLY:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-FUNC-DCU-04-S.tcl	SLIABITSTAT	0/1/1		
2	<b>Note:</b> When the command to switch ON Spectrometer LIAs is sent to the DRCU simulator ALL photometer LIA related HK parameters will go Out of Limits (Hard Limits). This is an inherent feature of the DRCU simulator which cannot be avoided.	SLIAP5V SLIAP9V SLIAM9V LIAS3TEMP LIAS2TEMP LIAS1TEMP	OOL OOL OOL OOL OOL OOL		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** The Spectrometer LIAs are on.



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.19 Procedure SPIRE-IST-SLIA-OFF

**Version:** 1.1

**Date:** 22<sup>nd</sup> August 2006

**Purpose:** Spectrometer LIAs switch off

**Duration:** 5 minutes

**Preconditions:**

- SPIRE is in REDY mode
- The Spectrometer LIAs are switched on

**Initial Configuration:**

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SFT 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	Check that SPIRE is in REDY mode	MODE	REDY		
2	Execute TCL script SPIRE-IST-SLIA-OFF.tcl	SLIABITSTAT	1/-/0		
3	Check Photometer LIA HK parameter values	SLIAP5V SLIAP9V SLIAM9V	~5.2/-/0.0V ~11.5/-/0.0V ~-11.5/-/0.0V		
<b>Test Result (Pass/Fail):</b>					



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### Procedure Steps for IST ONLY:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Check that SPIRE is in REDY mode	MODE	REDY		
2	Execute TCL script SPIRE-IST-SLIA-OFF.tcl	SLIABITSTAT	1/-/0		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** The Spectrometer LIAs are off.



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.20 Procedure SPIRE-IST-MCU-OFF

**Version:** 1.0

**Date:** 12<sup>th</sup> 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

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	REDY	
2	Execute SPIRE-IST-MCU-OFF.tcl	—	—	—	—
3	Check that the MCU is switched off	MCUBITSTAT	1/-/0		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** MCU switched off.



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 2.3.21 Procedure SPIRE-IST-SCU-OFF

**Version:** 1.1

**Date:** 12<sup>th</sup> June 2006

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

**Preconditions:**

**Initial Configuration:**

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

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		
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:** SPIRE in DRCU\_ON mode.



## Spire Procedure

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<b>Ref:</b>	SPIRE-RAL-PRC-2494
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### 2.3.22 Procedure SPIRE-IST-DRCU-OFF

**Version: 1.1**

**Date: 22<sup>nd</sup> 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	<b>When instructed by the I-EGSE staff Power off the SPIRE DRCU using CCS procedure XXXXXX</b>	—	—	—	

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

**Procedure Steps for AVM ONLY:**





## Spire Procedure

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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	—	—	—	
<b>Test Result (Pass/Fail):</b>					

### Final Configuration:

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



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### 2.3.23 Procedure SPIRE-IST-DPU-OFF

**Version:** 1.0

**Date:** 12<sup>th</sup> June 2006

**Purpose:** Switch off the DPU

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

**Initial Configuration:**

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

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Power off the SPIRE DRCU using the CCS procedure XXXXXX	—	—	—	
<b>Test Result (Pass/Fail):</b>					

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



## Spire Procedure

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**Ref:** SPIRE-RAL-PRC-2494  
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### 3.APPENDIX 1: NOMINAL SPIRE SWITCH-ON SEQUENCE

**Version:** 1.0

**Date:** 12<sup>th</sup> June 2006

**Purpose:** Switch On SPIRE instrument and put it in REDY mode

**Preconditions:**

- Procedure SPIRE instrument is switched off
- SPIRE is electrically integrated with the Herschel EQM.
- In case of loss of power the switch on sequence can be executed without any constraints.

**Initial Configuration:**

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute Procedure SPIRE-IST-DPU-ON	MODE	-/-/DPU_ON		
2	Execute Procedure SPIRE-IST-DRCU-ON	MODE	DPU_ON/-/DRCU_ON		
3	Execute TCL script SPIRE-IST-SCU-ON.tcl	SCUTEMPSTAT SUBKSTAT	0/-/0xFFFF 0/-/1		
4	Execute TCL script SPIRE-IST-MCU-ON	MCUBITSTAT	0/-/1		
5	Check that SPIRE is in REDY mode	MODE	DRCU_ON/-/REDY		

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

**Final Configuration:**

- SPIRE is in REDY mode
- SPIRE DPU is on and generating nominal HK at 4 second intervals



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### 4.APPENDIX 2: NOMINAL SPIRE SWITCH-OFF SEQUENCE

**Version:** 1.0

**Date:** 12<sup>th</sup> June 2006

**Purpose:** Switch Off SPIRE instrument from REDY mode.

**Preconditions:**

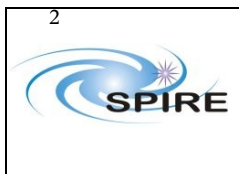
- SPIRE is electrically integrated with the Herschel satellite.
- SPIRE is in REDY mode
- This switch off sequence can be executed in an emergency or if there is a malfunction in the cryostat operations.

**Initial Configuration:**

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-MCU-OFF	MCUBITSTAT	1/1/0		
2	Execute TCL script SPIRE-IST-SCU-OFF	SCUTEMPSTAT SUBKSTAT MODE	0xFFFF/-/0 1/-/0 REDY/-/DRCU ON		
3	Execute Procedure SPIRE-IST-DRCU-OFF	MODE	DRCU_ON/- /DPU ON		
4	Check that HK generation has stopped. TM2N should not be incrementing anymore	—	—	—	
5	Execute Procedure SPIRE-IST-DPU-OFF	—	—	—	
<b>Test Result (Pass/Fail):</b>					

**Final Configuration:**

- SPIRE is switched off



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### 5.APPENDIX 3: SAFE SWITCH OFF IN CASE OF ANOMALY

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: 21<sup>st</sup> 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:

Step	Description	Parameter - Unit		Current value	Success/Failure
1	Check the current instrument configuration	MODE			
2	Case MODE 1: REDY → Go to step 3 2: DRCU_ON → Go to step 4				
3	Execute the following procedures in this document: <ul style="list-style-type: none"><li>▪ <a href="#">2.3.20</a></li><li>▪ <a href="#">2.3.21</a></li><li>▪ <a href="#">2.3.22</a></li></ul> Go to step 5				
4	Execute the following procedures in this document: <ul style="list-style-type: none"><li>▪ <a href="#">2.3.22</a></li></ul> Go to step 5				
5	Execute the following procedures in this document: <ul style="list-style-type: none"><li>▪ <a href="#">2.3.23</a></li></ul>				

**Final Configuration: SPIRE is OFF**