SPIRE IST Short Functional Test Procedures
S.D.Sidher & A.A.Aramburu

1. INTRODUCTION

This document describes the Short Functional Test (SFT) procedures to be executed on the SPIRE FM at 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)**. Some procedures can only be run after integration – where appropriate this is clearly indicated in the preconditions section of each procedure. This document gives step-by-step instructions on how to perform each test. These instructions have been extended so as to support their execution by the CCS without any I-EGSE intervention.

The appendices at the end include specific switch on and switch off sequences for the SPIRE instrument.

1.1 Change 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

1.2 Applicable 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

1.3 Reference Documents

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

RD02 SPIRE 3rd 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

1.4 General instructions for executing test procedures

- The procedures are listed here in the order in which they are expected to be performed. They start with procedures for switching on SPIRE and carrying out SFTs before finally switching off SPIRE at the end of the tests.

- 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.

- Any text in **boldface** in the procedural steps generally indicates an action which may have to be performed manually by the CCS staff.

1.5 Assumptions

- The CCS are only required to check changes in instrument configuration related HK parameters.
- For these functional tests the instrument will not always be in a pre-defined mode as listed in the IUM (**RD04**)

1.6 Open Issues

- Procedures for dealing with instrument contingencies will be addressed in the next version of this document.
- 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.

1.7 Duration

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**.

2. SHORT FUNCTIONAL TEST PROCEDURES

2.1 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

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

2.2 Procedure SPIRE-IST-DRCU-ON

Version: 1.0
Date: 12th June 2006
Purpose: To switch on the SPIRE DRCU and start generating housekeeping
Duration: 4 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched off
- 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-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):					

Final Configuration:

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

2.3 Procedure SPIRE-IST-FUNC-SCU-01

Version: 1.0
Date: 12th June 2006
Purpose: SCU science packet generation check
Duration: 2 minutes

Preconditions:

Initial Configuration:

- SPIRE DPU is on and generating HK
- DRCU is switched ON
- SFT 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

2.4 Procedure SPIRE-IST-FUNC-SCU-03

Version: 1.0
Date: 12th 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	**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/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	(All Values TBC) ~4.2K ~4.4K ~4.3K		

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
		SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	~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		
6	If the instrument is warm, record the values of SCU DC thermometry channels which are open circuit. **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	— — — — — — — — — — — — — — — —		
Test Result (Pass/Fail):					

2.5 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
- 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	**Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm**				
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	0/1/1		
4	If the instrument is at He 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. **Open Circuit Criterion:** **RAW reading in the range [0, -100]**	SUBKTEMP	—		
Test Result (Pass/Fail):					

Final Configuration: SCU AC thermometry is switched on.

2.6 Procedure SPIRE-IST-FUNC-SCU-07

Version: 1.0
Date: 11th June 2005
Purpose: SCU cooler heaters 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

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	A few seconds later record the value of parameter EVHSV – the Evaporator Heat Switch Voltage. *This voltage stays on for ~20 seconds.*	EVHSV - mV	0/~323/0		
4	A few seconds after the EVHSV parameter has been set back to 0, record the value of parameter SPHSV – the Sorption Pump Heat Switch Voltage. *This voltage stays on for ~20 seconds.*	SPHSV - mV	0/~323/0		
5	A few seconds after the SPHSV parameter has been set back to 0, record the value of parameter SPHTRV – the Sorption Pump Heater Voltage. *This voltage stays on for ~20 seconds.*	SPHTRV - V	0/~8.8/0		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

2.7 Procedure SPIRE-IST-FUNC-SCU-04

Version: 1.0
Date: 12th 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 **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		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

2.8 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
- 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	**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 ~30 seconds*	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 *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		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

2.9 Procedure SPIRE-IST-FUNC-MCU-01

Version: 1.0
Date: 12th 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.

2.10 Procedure: SPIRE-IST-FUNC-MCU-02

Version: 1.0
Date: 12th 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	—		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

2.11 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

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.

2.12 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

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		
Test Result (Pass/Fail):					

Final Configuration: BSM is switched off.

2.13 Procedure SPIRE-IST-FUNC-SMEC-01

Version: 1.0
Date: 12th 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 SMECLVDTPWR	0/-/4(TBD) 0/1/1		
Test Result (Pass/Fail):					

Final Configuration: SMECm is switched on.

2.14 Procedure SPIRE-IST-SMEC-OFF

Version: 1.0
Date: 12th 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	SMECENCPWR SMECLVDTPWR	4(TBD)/-/0 1/-/0		
Test Result (Pass/Fail):					

Final Configuration: SMECm is switched off.

2.15 Procedure SPIRE-IST-FUNC-DCU-01

Version: 1.0
Date: 12th 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

2.16 Procedure SPIRE-IST-FUNC-DCU-04-P

Version: 1.0
Date: 12th June 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

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		
Test Result (Pass/Fail):					

Final Configuration: The Photometer LIAs are on.

2.17 Procedure SPIRE-IST-PLIA-OFF

Version: 1.0
Date: 12th June 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

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		
Test Result (Pass/Fail):					

Final Configuration: The Photometer LIAs are off.

2.18 Procedure SPIRE-IST-FUNC-DCU-04-S

Version: 1.0
Date: 12th June 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

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		
Test Result (Pass/Fail):					

Final Configuration: The Spectrometer LIAs are on.

2.19 Procedure SPIRE-IST-SLIA-OFF

Version: 1.0
Date: 12th June 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

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		
Test Result (Pass/Fail):					

Final Configuration: The Spectrometer LIAs are off.

2.20 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

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		
Test Result (Pass/Fail):					

Final Configuration: MCU switched off.

2.21 Procedure SPIRE-IST-SCU-OFF

Version: 1.1
Date: 12th 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		
Test Result (Pass/Fail):					

Final Configuration: SPIRE in DRCU_ON mode.

2.22 Procedure SPIRE-IST-DRCU-OFF

Version: 1.0
Date: 12th June 2006
Purpose: Switch off the DRCU

Preconditions:

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

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-DRCU-OFF.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	—	—	—	
3	Check that TM2N parameter is not incrementing anymore	—	—	—	
4	Power off the SPIRE DRCU using CCS procedure XXXXXX	—	—	—	
Test Result (Pass/Fail):					

Final Configuration:

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

2.23 Procedure SPIRE-IST-DPU-OFF

Version: 1.0
Date: 12th 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	—	—	—	
Test Result (Pass/Fail):					

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

3. APPENDIX 1: SPIRE SWITCH-ON SEQUENCE

Version: 1.0
Date: 12th 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

4. APPENDIX 2: SPIRE SWITCH-OFF SEQUENCE

Version: 1.0
Date: 12th 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	—	—	—	
Test Result (Pass/Fail):					

Final Configuration:

- SPIRE is switched off