



SPIRE Document

SPIRE ILT WARM SHORT FUNCTIONAL TEST PROCEDURE A.A.Aramburu

Ref: SPIRE-RAL-PRC-002583
Issue: 1.0
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1. INTRODUCTION

This document specifies the necessary steps to execute a WARM SHORT SPIRE functional test during ILT test campaigns. It currently applies to the PFM model of SPIRE but it can be applied to further models as a minimum set of tests to verify the instrument correct functioning.

1.1 SCOPE

To judge the success or failure of a warm functional test by checking that:

- The telecommand sequence generated for a particular functional test is correctly received and executed on board by the SPIRE DPU.
- No error/event reports or command failures are generated during the execution of these commands.
- Telemetry is generated by the instrument as a result of telemetry requests to its different subunits.
- Particular telemetry parameters for each functional test change in an expected manner.
- A particular success criterion/criteria (specified in this document) is/are met.

1.2 REFERENCE DOCUMENTS

Ref	Document	Name	Version/Issue Nb.
RD01	SPIRE-RAL-DOC-001652	SPIRE Functional Tests Specification	Issue 1.4
RD02	SPIRE-RAL-DOC-001630	SPIRE EGSE-ILT Start-Up Procedures	Issue 0.7
RD03	SPIRE-RAL-PRC-002222	DRCU Switch ON Procedure	Issue 1.0
RD04	SPIRE-RAL-PRJ-001078	SPIRE Data ICD	Issue 2.0
RD05	Sap-SPIRE-CCa-076-02	DRCU/DPU Interface Control Document	Issue 1.2
RD06	LAM.PJT.SPI.NOT.011011	MCU/DPU Command List ICD	Issue 5.0
RD07	SPIRE-IFS-PRJ-001391	SPIRE OBS User Manual	Issue 2.1
RD08		SPIRE ILT Functional Testing Overview	

1.3 CHANGE RECORD

Document	Change date	Changes
Issue 1.0	27/02/06	Document created from the WFT Procedure.



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2. FUNCTIONAL TEST CONFIGURATION

2.1 Software Configuration

Annotate in the table the current EGSE software configuration for the tests:

EGSE component	Version/Build number	Comment
SCOS2000		
HCSS		
QLA		
QLA scripts		
Test Control scripts		
CUS Scripts		

2.2 EGSE Configuration Checks

To check for the success of failure of a functional test, the real time telemetry of the instrument has to be monitored. The following applications must be running to do so. Before the test sequence starts, make the following checks:

Workstation	EGSE component	Status	Check
Lichfield	EGSE router	Started	
Lichfield	EGSE Gateway	Started	
Lichfield	Telemetry Ingestion	Started	
Lichfield	Packet Display	Started	
Lincoln	SCOS2000	Started	
Lincoln	EXIF + TOPE	Started	
Lincoln	Manual Stack	Started	
Gordon	CDMS Simulator	Started	
Lincoln	Test Control Server	Started	



2.3 SPIRE Instrument Configuration

The functional test flow is such that at a given time during the procedure is possible that the instrument configuration does not conform to any nominal configuration as specified in Annexe 1. Nevertheless the configuration prior and after a test is specified for each functional test, and were applicable and the instrument configuration is in accordance to Anexel, this will be denoted by showing the main configuration in blue bold font and any additional subsystems configuration in black.

The **initial** instrument configuration for Short WFT does conform to a 'known' configuration and should be SPIRE **DRCU_ON**.

Perform the following actions to ensure that the instrument is in the correct configuration for the tests.

Step#	Action	Comments	Check
1	In SCOS open DPU_AND_OBS_PARAMETERS display Check if : TM2N is incrementing by one @1Hz. TM1N is incrementing by one @0.5Hz. - If they are, go to step 5. - If they are not, go to step 2.	In SCOS Main Window start either MON1 or MON2 tasks.	
2	Check if the DPU is powered ON: - If ON, the DPU power supply LCD will show ~ 28V and 0.40A, go to step 4. - If not ON, power ON DPU see comments on the right, then go to step 3.	To power ON the DPU press the main switch on the front bottom left of the DPU power supply, wait for the LCD display to show 28 V reading and then press the secondary switch on the front bottom right labelled <i>Input 1</i>.	
3	In SCOS open Boot_ROM_Memory_Check display and check no errors are reported: - If no errors are reported, execute DPU_ON from HCSS Test Procedures. Then repeat step 1. - If the (5,2) contains errors: Check the error code in RD07. Then switch OFF the DPU and repeat step 2	As soon as DPU is powered ON, the boot software performs some internal checks and generates: <ul style="list-style-type: none"> • A (5, 2) event TM packet for DPU models previous to CFM model • A (5,1) event for the CFM model and further ones This packet contains the number of errors at check time.	
4	Execute define_new_HK_report.tcl HCSS Test procedure. Repeat step 1.		
5	In SCOS open SCU_PARAMETERS display - If SCUP5V/P9V/M9V are jittering and BIAS_PARAMETERS display - If BIAS1TEMP, BIAS2TEMP, ... show ambient temperature, the DRCU is ON. Go to step 6. - If DRCU is not ON, refer to RD03 on how to start up the DRCU.		
6	In SCOS open DPU_AND_OBS_PARAMETERS display and check that the MODE housekeeping parameter is DRCU_ON .	MODE (RAW)= 0x100 MODE (ENG) = DRCU_ON	

Table 1. Initial configuration check



3. TEST PROCEDURE

The following two sections describe general pass/fail criteria (Section 3.1), the general test procedure layout (Section 3.1) and the detailed procedure for each functional test (Section 3.2).

3.1 GENERAL PASS/FAIL CRITERIA

The general criterion for declaring a single test failed is the repeated failure of 2 consecutive runs of this test. In that case the functional test procedure should be aborted and the overall functional testing declared FAILED.

In the case of a 'first run' failure followed by a successful execution a third run of the same test should be performed and in the unlikely event of this third run being a failure the test procedure should be also aborted and the overall functional testing declared FAILED, as this would imply a not reliable operability of the instrument.

As a general remark ANY failure should be closely analyzed.

Note: If the functional test is declared FAILED refer to section 4.1 for instrument switch OFF.

3.2 GENERAL TEST PROCEDURE LAYOUT

The table below shows the general Short WFT sequence as it should be performed. In each step of this procedure the operator should refer to the detailed procedure in Section 3.2. Test Control TCL scripts are available to invoke the correspondent CUS script stored in the HCSS database for each functional test. These CUS scripts will generate the appropriate command sequence for the particular functional test.

Step	Subsystem tested	Test Id	Test Purpose
1	SCU	FUNC-SCU-01	SCU Nominal Science Generation Check
2		FUNC-SCU-03	FPU DC Thermometry Check
3		FUNC-SCU-06	FPU AC Thermometry Check
4		FUNC-SCU-07	Sorption Cooler Check
5		FUNC-SCU-04	Photometer Calibrator Check
6		FUNC-SCU-05	Spectrometer Calibrators Check
9	MCU	FUNC-MCU-01	MCU Boot Check
10		FUNC-MCU-02	MCU Nominal Science Generation Check
11	BSMm	FUNC-BSM-01	BSM Switch ON Check
12		FUNC-BSM-03	BSM Open Loop dynamics Check
13	SMECm	FUNC-SMEC-02A/B*	SMEC Launch Latch Open/Close Check
14		FUNC-SMEC-01	SMECm Switch ON Check
15		FUNC-SMEC-03	SMEC LED Integrity Check
16		FUNC-SMEC-04	SMEC Positioning Test (Open Loop)
17	DCU	FUNC-DCU-01	DCU Nominal Science Generation Check
18	Photometer LIAs	FUNC-DCU-04P	Photometer LIAs Check
19	Spectrometer LIAs	FUNC-DCU-04S	Spectrometer LIAs Check

Table 2. General Short WFT sequence



3.3 DETAILED TEST PROCEDURE

The following is a detailed (test by test) procedure including the steps required to perform each functional test individually.

Step#	Action	Comments
0	Open SCU_PARAMETERS display on SCOS Alpha Numeric Displays.	

3.3.1 FUNC-SCU-01

Test Id:	FUNC-SCU-01												
Initial Configuration:	DRCU_ON												
Final Configuration:	DRCU_ON												
Success Criteria:	<p>Test passed if :</p> <ol style="list-style-type: none"> Two SCU Nominal Science Report telemetry packets are received on QLA with the following characteristics: <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>APID</th> <th>Type</th> <th>Subtype</th> <th>SID</th> <th>FrameID</th> <th>Frame length</th> </tr> </thead> <tbody> <tr> <td>0x508</td> <td>21</td> <td>1</td> <td>0xA20</td> <td>0x20</td> <td>0x1E</td> </tr> </tbody> </table> <ol style="list-style-type: none"> The frame time difference between consecutive SCU frames within these packets corresponds to the sampling rate. Nominal SCU sampling rate is 80Hz → Δt = 12.5 ms The SPIRE HK parameter SCUFRAMECNT increments by 31. No events are generated during the frame generation. <p>QLA to give go ahead.</p>	APID	Type	Subtype	SID	FrameID	Frame length	0x508	21	1	0xA20	0x20	0x1E
APID	Type	Subtype	SID	FrameID	Frame length								
0x508	21	1	0xA20	0x20	0x1E								

Test Procedure:

Step#	Action	Comments
1	Annotate the initial value of SCUFRAMECNT parameter located in SCU_PARAMETERS display.	
2	Run QLA script FUNC-SCU-01.py on QLA console.	
3	Run FUNC-SCU-01 test procedure from the HCSS Test Procedure window on TOPE	
4	Annotate the final value of SCUFRAMECNT.	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result



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FUNC-SCU-01	SCUFRAMECNT	n/ n+ 31			
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Start time @:
End time @:
OBSID:
Comments:



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3.3.2 FUNC-SCU-03

Test Id:	FUNC-SCU-03
Initial Configuration:	DRCU_ON
Final Configuration:	DRCU_ON + DC thermometry ON
Success Criteria:	<p>Test passed if all FPU DC thermometry sensors show temperature values indicating a correct functioning of the sensor, not open/short-circuited. If ANY reading is anomalous check RAW sensor reading.</p> <p>Open Circuit Criterion: RAW reading in the range [0, -100]</p> <p>Short Circuit Criterion: RAW reading of -32768</p> <p>Note: For some parameters the calibration curve above 75K has only 2 points, thus the linearly interpolated temperature reading given by SCOS is usually not correct at $T > 75K$.</p>

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-03 test procedure from the HCSS Test Procedure window on TOPE	
2	When the test is finished annotate the current value of SCUTEMPSTAT and the RAW/converted values of the 16 FPU temperatures located in SCU_PARAMETERS display.	
3	Contingency: If test fails execute SCU_OFF procedure from HCSS Test Procedure window on TOPE and then repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-03	SCUTEMPSTAT	0/0xFFFF		N/A	
<p>Start time @:</p> <p>End time @:</p> <p>OBSID:</p> <p>Commets:</p>					



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3.3.3 FUNC-SCU-06

Test Id:	FUNC-SCU-06
Initial Configuration:	DRCU_ON + DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON
Success Criteria:	Test passed if SUBKSTAT parameter went from 0 to 1. Open Circuit Criterion: RAW reading in the range 0 -100 Short Circuit Criterion: RAW reading of -32768

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-06 test procedure from the HCSS Test Procedure window on TOPE.	
2	When the test is finished annotate the current value of SUBKSTAT located in SCU_PARAMETERS display. Also write down the RAW value of the SUBKTEMP parameter.	
3	Contingency: If test fails : 1. Send manual command: SEND_DRCU_COMMAND Parameter1 = 0xA0860000 Parameter2 = 0 2. Then repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-06	SUBKSTAT	0/1		N/A	

Start time @:
End time @:
OBSID:
Comments:



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3.3.4 FUNC-SCU-07

Test Id:	FUNC-SCU-07													
Initial Configuration:	DRCU_ON + AC/DC thermometry ON													
Final Configuration:	DRCU_ON + AC/DC thermometry ON													
Success Criteria:	Test passed if during the execution of the test the following SCU HK parameters give correspondent readings of:													
	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>SCU HK parameter</th> <th>RAW</th> <th>Converted</th> </tr> </thead> <tbody> <tr> <td>SPHSV</td> <td>~12715</td> <td>~323mV</td> </tr> <tr> <td>EVHSV</td> <td>~12715</td> <td>~323mV</td> </tr> <tr> <td>SPHTRV</td> <td>~14390</td> <td>~ 8 V</td> </tr> </tbody> </table>	SCU HK parameter	RAW	Converted	SPHSV	~12715	~323mV	EVHSV	~12715	~323mV	SPHTRV	~14390	~ 8 V	
SCU HK parameter	RAW	Converted												
SPHSV	~12715	~323mV												
EVHSV	~12715	~323mV												
SPHTRV	~14390	~ 8 V												

Test Procedure:

Step#	Action	Comments
1	Run FUNC-SCU-07 test procedure from the HCSS Test Procedure window on TOPE.	
2	While the test is running annotate the values of current values of SPHSV, EVHSV, SPHTRV located in SCU_PARAMETERS display. (RAW and CONVERTED)	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-07	SPHSV EVHSV SPHTRV	0/ ~ 323 mV 0/ ~ 323 mV 0/ ~ 8 V		N/A	

Start time @:
End time @:
OBSID:
Commts:



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3.3.5 FUNC-SCU-04

Test Id:	FUNC-SCU-04
Initial Configuration:	DRCU_ON + AC/DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON
Success Criteria:	<p>Test passed if PCALCURR/PCALV SCU HK parameters show the following values:</p> <ul style="list-style-type: none"> PCALCURR HK parameter which shows the measured PCAL current is ~ 0.1 mA. PCALV HK parameter which shows the measured PCAL voltage is ~ 0.02V

Test Procedure:

Step#	Action	Comments
1	Annotate the current value of PCALV and PCALCURR located in SCU_PARAMETERS display.	
2	Run FUNC-SCU-04 test procedure from the HCSS Test Procedure window on TOPE	
3	While the test is running Annotate the values of PCALV and PCALCURR.	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-04	PCALCURR PCALV	0/0.1mA 0/0.02V		N/A	

Start time @:
End time @:
OBSID:
Commets:



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3.3.6 FUNC-SCU-05

Test Id:	FUNC-SCU-05
Initial Configuration:	DRCU_ON + AC/DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON
Success Criteria:	Test passed if : <ul style="list-style-type: none"> • SCAL2CURR ,SCAL4CURR HK parameters which show the measured current read ~ 0.1 mA • SCAL2V,SCAL4V parameters which show the measured voltage read ~ 0.05V.

Test Procedure

Step#	Action	Comments
1	Annotate the current value of SCAL2V ,SCAL2CURR,SCAL4V,SCAL4CURR located in SCU_PARAMETERS display.	
2	Run FUNC-SCU-05 test procedure from the HCSS Test Procedure window on TOPE	
3	While the test is running write the values of SCAL2V ,SCAL2CURR,SCAL4V,SCAL4CURR.	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SCU-05	SCAL2CURR SCAL2V SCAL4CURR SCAL4V	0/0.1mA 0/0.05V 0/0.1mA 0/0.05V		N/A	

Start time @:
End time @:
OBSID:
Commetts:



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Step#	Action	Comments
0	Open MCU_PARAMETERS display on SCOS Alpha Numeric Displays.	

3.3.7 FUNC-MCU-01

Test Id:	FUNC-MCU-01
Initial Configuration:	DRCU_ON + AC/DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON
Success Criteria:	Test passed if: <ol style="list-style-type: none"> 1. MCU boots. 2. MCU voltages show expected values. 3. MAC Board Temperature Reading shows ambient temperature.

Test Procedure:

Step#	Action	Comments
1	Run FUNC-MCU-01 test procedure from the HCSS Test Procedure window on TOPE	
2	When procedure is finished Annotate the values of the MCU voltages.	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-01	MCUP5V MCUP15V MCUP14V MCUM14V MCUM15V MCUMACTEMP	N/A / ~ 5V N/A / ~15V N/A / ~ 14V N/A / ~ -14V N/A / ~ -15V N/A / ~ 300K		N/A	

Start time @:
End time @:
OBSID:
Commetts:



3.3.8 FUNC-MCU-02

Test Id:	FUNC-MCU-02																																			
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON																																			
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON																																			
Success Criteria:	<p>Test passed if :</p> <ol style="list-style-type: none"> MCU produces each type of the frames requested and with the following characteristics. <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Frame</th> <th>APID</th> <th>Type</th> <th>Subtype</th> <th>SID</th> <th>FrameID</th> <th>Frame length</th> </tr> </thead> <tbody> <tr> <td>Eng.</td> <td>0x508</td> <td>21</td> <td>3</td> <td>0x814</td> <td>0x14</td> <td>0x15</td> </tr> <tr> <td>BSM</td> <td>0x508</td> <td>21</td> <td>1</td> <td>0x612</td> <td>0x12</td> <td>0xD</td> </tr> <tr> <td>SMEC</td> <td>0x508</td> <td>21</td> <td>1</td> <td>0x410</td> <td>0x10</td> <td>0xC</td> </tr> <tr> <td>BSM +SMEC</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <ol style="list-style-type: none"> No events are generated during the different frames generation. 	Frame	APID	Type	Subtype	SID	FrameID	Frame length	Eng.	0x508	21	3	0x814	0x14	0x15	BSM	0x508	21	1	0x612	0x12	0xD	SMEC	0x508	21	1	0x410	0x10	0xC	BSM +SMEC						
Frame	APID	Type	Subtype	SID	FrameID	Frame length																														
Eng.	0x508	21	3	0x814	0x14	0x15																														
BSM	0x508	21	1	0x612	0x12	0xD																														
SMEC	0x508	21	1	0x410	0x10	0xC																														
BSM +SMEC																																				

Test Procedure:

Step#	Action	Comments
1	Annotate the current value of MCUFRAMECNT located in MCU_PARAMETERS display	
2	Run QLA script FUNC-MCU-02.py on QLA console.	
3	Run FUNC-MCU-02 test procedure from the HCSS Test Procedure window on TOPE	
4	When test is finished annotate the current value of MCUFRAMECNT.	
5	Contingency: If test fails repeat steps 1 to 4.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-MCU-02	MCUFRAMECNT	0/ ~ 3300			
Start time @: End time @: OBSID: Comments:					



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Step#	Action	Comments
0	Open CHOP PARAMETERS display on SCOS Alpha Numeric Displays.	

3.3.9 FUNC-BSM-01

Test Id:	FUNC-BSM-01
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if: <ol style="list-style-type: none"> 1. CHOPSENSPWR HK parameter goes from 0 to 1 2. CHOPDACVAL HK parameter goes from 0 to 0x8000 3. CHOPSENSIG HK parameter shows variation from off to on 4. JIGGSENSPWR HK parameter goes from 0 to 1 5. JIGGDACVAL parameter goes from 0 to 0x8000 6. JIGGSENSSIG HK parameter shows variation from off to on

Test Procedure

Step#	Action	Comments
1	On QLA bring up a time series display of the following HK parameters: CHOPSENSPWR CHOPDACVAL CHOPSENSIG JIGGSENSPWR JIGGDACVAL JIGGSENSSIG	
2	Run FUNC-BSM-01 test procedure from the HCSS Test Procedure window on TOPE	
3	When the test is finished record all the Key parameters noted bellow	
	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-01	CHOPSENSPWR CHOPLOOPMODE CHOPDACVAL CHOPFFGAIN CHOPSENSSIG JIGGSENSPWR JIGGLOOPMODE JIGGDACVAL JIGGFFGAIN JIGGSENSSIG	0/1 0/3 0/0x8000 0/0xBEB 0/? 0/1 0/3 0/0x8000 0/0xBEB 0/?		N/A	



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3.3.10 FUNC-BSM-03

Test Id:	FUNC-BSM-03
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Success Criteria:	Test passed if the chop sensor signal evolves in the same way as the positions set.(i.e if (pos1 > pos2 → sig1 > sig2) for each jiggle position. Note: During warm tests the voltages on both chop and jiggle motors are likely to be saturated (CHOP/JIGGMOTORVOLT RAW values of ~ 0xFFFF) due to the high resistance of the motor coil at ambient temperature.

Test Procedure

Step#	Action	Comments
1	On QLA open up a time series display of HK parameters: CHOPPOSN CHOPDACVAL CHOPMOTORCURR CHOPSENSSIG CHOPMOTORBEMF JIGGPOSN JIGGDACVAL JIGGMOTORCURR JIGGSENSSIG JIGGMOTORBEMF	
2	Run FUNC-BSM-03 test procedure from the HCSS Test Procedure window on TOPE	
3	Contingency: If test fails repeat step 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-BSM-03				N/A	

Start time @:
End time @:
OBSID:
Comments:



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Step#	Action	Comments
4	Execute BSM_OFF from HCSS Test Procedures	



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Step#	Action	Comments
0	Open SMEC PARAMETERS display on SCOS Alpha Numeric Displays.	

3.3.11 FUNC-SMEC-01

Test Id:	FUNC-SMEC-01
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if : <ol style="list-style-type: none"> 1. SMECENCPCR HK parameter changes from 0 to 6. 2. SMEC encoder signals 1 and 2 amplitude show variation when encoder is switched ON. 3. SMEC LVDT is switched ON. 4. SMEC LVDT DC and AC signals show variation when LVDT is switched ON.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a display of the following HK parameters: SMECENCPCR SMECENCPCR1AMP SMECENCPCR2AMP SMECLVDTDCSIG SMECLVDTACSIG	
2	Run FUNC-SMEC-01 test procedure from the HCSS Test Procedure window on TOPE	
	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-01	SMECENCPCR SMECLVDTPCR SMECENCPCR1 SMECENCPCR2			N/A	



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Start time @:

End time @:

OBSID:

Comments:



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3.3.12 FUNC-SMEC-03

Test Id:	FUNC-SMEC-03
Initial Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if: SMEC encoder signals 1 and 2 show a variation on their amplitudes from one LED illumination level to another.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the following Nominal HK parameters: SMECENC SIGAMP1 SMECENC SIGAMP2	
2	Run FUNC-SMEC-03 test procedure from the HCSS Test Procedure window on TOPE	
3	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-03	SMECENC PWR SMECENC SIG1AMP SMECENC SIG2AMP				

Start time @:
End time @:
OBSID:
Comments:



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3.3.13 FUNC-SMEC-04a

Test Id:	FUNC-SMEC-04a
Initial Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop)
Final Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON+ SMEC ON (open loop)
Success Criteria:	Test passed if SMECLVDTDCSIG parameter shows a variation according to the different positions set.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the following Nominal HK parameters: SMECENC SIG1 SMECENC SIG2 SMECLVDTDCSIG SMECLVDTAC SIG SMECMOTORCURRE	
2	Run FUNC-SMEC-04a test procedure from the HCSS Test Procedure window on TOPE	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-SMEC-04a	SMECLVDTDCSIG				
Start time @: End time @: OBSID: Comments:					

Step#	Action	Comments
4	Execute SMEC_OFF from HCSS Test Procedures	



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Step#	Action	Comments
0	Open DCU PARAMETERS SCOS Alpha Numeric Display	

3.3.14 FUNC-DCU-01

Test Id:	FUNC-DCU-01																																																																
Initial Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON																																																																
Final Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON																																																																
Success Criteria:	<p>Test passed if:</p> <ol style="list-style-type: none"> DCU produces each type of DCU nominal science frame with the following characteristics. <table border="1"> <thead> <tr> <th>APID</th> <th>Type</th> <th>S.type</th> <th>SID</th> <th>Frame ID</th> <th>Frame type</th> <th>Nb. Of frames</th> <th>Nb. of pkts.</th> </tr> </thead> <tbody> <tr> <td>0x504</td> <td>21</td> <td>1</td> <td>0x200</td> <td>0</td> <td>PF</td> <td>100</td> <td>100</td> </tr> <tr> <td>0x506</td> <td>21</td> <td>1</td> <td>0x201</td> <td>1</td> <td>SF</td> <td>100</td> <td>17</td> </tr> <tr> <td>0x504</td> <td>21</td> <td>2</td> <td>0x102</td> <td>2</td> <td>PSW</td> <td>100</td> <td>34</td> </tr> <tr> <td>0x504</td> <td>21</td> <td>2</td> <td>0x103</td> <td>3</td> <td>PMW</td> <td>100</td> <td>25</td> </tr> <tr> <td>0x504</td> <td>21</td> <td>2</td> <td>0x104</td> <td>4</td> <td>PLW</td> <td>100</td> <td>12</td> </tr> <tr> <td>0x506</td> <td>21</td> <td>2</td> <td>0x105</td> <td>5</td> <td>SSW</td> <td>100</td> <td>12</td> </tr> <tr> <td>0x506</td> <td>21</td> <td>2</td> <td>0x106</td> <td>6</td> <td>SLW</td> <td>100</td> <td>7</td> </tr> </tbody> </table> <ol style="list-style-type: none"> The frame time difference between consecutive DCU frames of each type corresponds to the sampling rate. Photometer Sampling rate is 15.3Hz → Δt ~ 65.5 ms Spectrometer Sampling rate is 80Hz → Δt = 12.5 ms The SPIRE HK parameter DCUFRAMECNT increments by 700. No events are generated during the frames generation. 	APID	Type	S.type	SID	Frame ID	Frame type	Nb. Of frames	Nb. of pkts.	0x504	21	1	0x200	0	PF	100	100	0x506	21	1	0x201	1	SF	100	17	0x504	21	2	0x102	2	PSW	100	34	0x504	21	2	0x103	3	PMW	100	25	0x504	21	2	0x104	4	PLW	100	12	0x506	21	2	0x105	5	SSW	100	12	0x506	21	2	0x106	6	SLW	100	7
APID	Type	S.type	SID	Frame ID	Frame type	Nb. Of frames	Nb. of pkts.																																																										
0x504	21	1	0x200	0	PF	100	100																																																										
0x506	21	1	0x201	1	SF	100	17																																																										
0x504	21	2	0x102	2	PSW	100	34																																																										
0x504	21	2	0x103	3	PMW	100	25																																																										
0x504	21	2	0x104	4	PLW	100	12																																																										
0x506	21	2	0x105	5	SSW	100	12																																																										
0x506	21	2	0x106	6	SLW	100	7																																																										

Test Procedure:

Step#	Action	Comments
1	Annotate the current value of DCUFRAMECNT located d in DCU PARAMETERS AND	
2	Run FUNC-DCU-01 test procedure from the HCSS Test Procedure window on TOPE	
3	Annotate the current value of DCUFRAMECNT located d in DCU	



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	PARAMETERS AND	
4	Contingency: If test fails repeat steps 1 to 3.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-01	DCUFRAMECNT	0/700			

Start time @:
End time @:
OBSID:
Comments:



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3.3.15 FUNC-DCU-04P

Test Id:	FUNC-DCU-04P
Initial Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON + Photometer LIAs ON
Success Criteria:	Test passed if : <ol style="list-style-type: none"> 1. SCUDCDCSTAT parameter goes from 4 to 5. 2. Photometer LIA card voltages are showing correct readings of +5V,+9V,-9V. 3. Photometer LIA temperatures show an increase indicating that they are ON.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the HK parameters: PLIAP5V PLIAP9V PLIAM9V LIA1/2/3/4/5/6/7/8/9TEMP	
2	Run FUNC-DCU-04P test procedure from the HCSS Test Procedure window on TOPE	
5	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04P	SCUDCDCSTAT PLIAP5V PLIAP9V PLIAM9V LIA1/2/3/4/5/6/7/9TEMP	4/5 0/~ +5V 0/~+9V 0/~-9V N/A/ [290-300]K			

Start time @:
End time @:
OBSID:
Commts:



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3.3.16 FUNC-DCU-04S

Test Id:	FUNC-DCU-04S
Initial Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON
Success Criteria:	Test passed if : <ol style="list-style-type: none"> 1. SCUDCDCSTAT parameter goes from 4 to 6. 2. Spectrometer LIA card voltages are showing correct readings of +5V,+9V,-9V. 3. Spectrometer LIA temperatures show an increase indicating that they are ON.

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of the HK parameters: SLIAP5V SLIAP9V SLIAM9V LIAS1/2/3TEMP	
2	Run FUNC-DCU-04S test procedure from the HCSS Test Procedure window on TOPE	
5	Contingency: If test fails repeat steps 1 and 2.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
FUNC-DCU-04S	SCUDCDCSTAT SLIAP5V SLIAP9V SLIAM9V LIA1/2/3TEMP	4/6 0/~ +5V 0/~+9V 0/~-9V N/A/ [290-300]K			

Start time @:
End time @:
OBSID:
Commts:



4. END TEST SEQUENCE

4.1 NORMAL END TEST SEQUENCE

The following table shows the necessary steps to be followed to end the warm functional test sequence.

Step#	Action	HK parameters	Expected Value	Comments	Check
1	Check BSM is OFF	CHOPSENSPWR JIGGSENSPWR	0 0		
2	Check SMEC is OFF	SMECENCPCR	0		
3	Run MCU-OFF from the HCSS Test Procedure window on TOPE	SCUDCDCSTAT	0		
4	Check Instrument Configuration	MODE	0x100/ DRCU_ON		
5*	Run SCU_OFF from the HCSS Test Procedure window on TOPE	SCUDCDCSTAT SUBKSTAT	0 0		
6*	Run DRCU_OFF from the HCSS Test Procedure window on TOPE	MODE	0/ DPU_ON		

* These two steps should ONLY be executed if the functional test takes place BEFORE the instrument is placed in the test cryostat. If the instrument is already in the cryostat and the cryo-harness are connected this steps should NOT be executed.

FINAL INSTRUMENT CONFIGURATION IN THE CASE STEPS 1 to 4 are executed is DRCU_ON

FINAL INSTRUMENT CONFIGURATION IN THE CASE STEPS 1 to 6 are executed is DPU_ON

4.2 END TEST SEQUENCE WHEN THE FUNCTIONAL TEST HAS FAILED

The following table shows the necessary steps to be followed to end the warm functional test sequence when this has been declared failed.

Step#	Action	HK parameters	Expected Value	Comments	Check
1	Check BSM is OFF	CHOPSENSPWR JIGGSENSPWR	0 0		
2	Check SMEC is OFF	SMECENCPCR	0		
3	Run MCU-OFF from the HCSS Test Procedure	SCUDCDCSTAT	0		



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	window on TOPE				
4	Check Instrument Configuration	MODE	0x100/ DRCU_ON		
5	Run SCU_OFF from the HCSS Test Procedure window on TOPE	SCUDCDCSTAT SUBKSTAT	0 0		
6	Run DRCU_OFF from the HCSS Test Procedure window on TOPE	MODE	0/ DPU_ON		

FINAL INSTRUMENT CONFIGURATION IN THE CASE STEPS DPU_ON

