EADS astrium

Test Report

Herschel

Title: Test Report for SPIRE FM Reduced CFT @ HeI Conditions

CI-No: 125 200

Prepared by:	A. Koppe	Date: 14.04.2008
Checked by:	S. Idler	14.04.2008
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Distribution: See Distribution List (last page)

Issue	Date	Sheet	Description of Change	Release
1	25.03.08	All	Formal Issue	

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1 Scope

This document reports on the Reduced CFT performed on the SPIRE FM Instrument to check correct operation, after cool down of the HERSCHEL satellite to He1 temperatures. The test was executed with the S/C in vertical position using the Herschel CCS & I-EGSE.

1.1 Objective

The objectives of this reduced Cold CFT were:

- To check the correct functional operation of the SPIRE FM instrument under He1 conditions.
- To check the mechanism latch status and the associated current readings on the instrument synoptic.

1.2 Test Flow

The reduced CFT test flow was structured to reflect nominal operations of SPIRE as much as possible to enable re-use higher-level Satellite tests.

The flow is as follows:

1. Power on and configure EGSE and satellite for test (ref. to test steps chapter 7.2.1 of test procedure [AD1])
2. Power on SPIRE prime DPU and DRCU to REDY (Standby) mode (ref. to test steps chapter 7.2.2 of test procedure [AD1])
3. Perform SPIRE Cold Functional tests - nominal (ref. to test steps chapter 7.2.3 of test procedure [AD1])
4. execute SPIRE Latch Status test according to AD2
5. Switch OFF SPIRE prime DPU and DRCU (ref. to test steps chapter 7.2.4 of test procedure [AD1])
6. Satellite and EGSE switch off(ref. to test steps chapter 7.2.10 of test procedure [AD1])

1.3 Procedure Execution Summary:

This test has been run with the HERSCHEL S/C in vertical position (X - axis vertical, precision ±0.5°) and on SPIRE nominal side only.

The cryo L3 temperature was around 11K for switch on of the JFETs (ref. to as procedure).

The test duration of the SPIRE CFT was 7 hours 25 min.

The following protocols have been written documenting the SPIRE reduced CFT status:

TRR for SPIRE Reduced CFT 05.03.2008, HP-2-ASED-MN-1504

PTR for SPIRE Reduced CFT 07.03.2008, HP-2-ASED-MN-1507

Location: ESTEC, Noordwijk, NL

Test Session Name (prime):
2008_03_07_05_33_hercdmu_hpws22_REALTIME_SPIRECFT

Environment: HP_2_ASED_SD_0270_BEGIN_001

OBSW: CDMS 3.1.3, ACMS 3.7

HPSDB: HPSDB 3.3.1.30, R_TM_HERSCH_FM9_C_802251518, LI-1441 issue 8 draft 1

HPCCS Release: Hpccs_2.0-1219

Any procedure variations are recorded in the Procedure Variation Summary in § 7.1 for the corresponding “as-run” procedure.

All non-compliances are recorded in the Observation/NCR Summary below and detailed further in Section 3.

The following observations were made during the test**:**

Time (UTC)	Test Procedure / Step / Script / Command / Event / Anomaly	Remarks / Cause of anomaly / Corrective action	Item Affected	NCR/SPR ref. (PA)	Affects Test Objective
05:00	S/C Not Powered !!				
	Tag not set !!				
	Tag created				
06:00	S/C Powered				
06:36	Ready to start TP-217 Section 7.2.3 Step 1				
08:04	Operator error. Step 2 of PRC-2398 Section 4.2.14 executed before Step1	PVS1: Allow script to complete and then perform step 1			
10:01	PRC-2398 Section 4.2.24 Step 2, script halts with error.	Script terminated. SPR raised, to be investigated offline. Did not affect test.		SPR-347	
	Continuing with next section				
10:29	PRC-2398 Section 4.2.26 Step 2: RAL report problem with Spectrometer JFET switch on	Level 3 Temp OK, PVS2 raised to switch off SDET and switch-on JFETs again. Still appear not to be working. Further steps added to PVS to skip to Spectrometer JFET VSS test. JFET switch on in this test.		NCR-3996	
13:06	PVS3 raised to perform spectrometer JFET test again using an update to the IEGSE database.				
	PVS3 complete				
14:01	SPIRE CFT complete				
14:18:00	Started ACS... SPIRE LPU test.			NCR-4000	
14:26:00	Step 8 of SPIRE LPU test. LCL25 relay status wm12B565 OFF, WM107565 (current) .508 A. For LCL 26 WMA2B565 status off, WMA07565 (current) 0.88 A				
14:35:00	Finished ACS... SPIRE LPU test.				Test aborted

Table 1: SPIRE Reduced CFT Summary

2 Documents/Drawings

2.1 Applicable Documents

AD 1	SPIRE CFT in He1 prior to SVT	HP-2-ASED-SD-0270, iss.1
AD2	SPIRE Latch Status Test	HP-2-ASED-SD-0278, Issue 1
AD3	SPIRE LPU Check	HP-2-ASED-SD-0281, Issue 1
AD4	HERSCHEL IST SPIRE INSTRUMENT COMMISSIONING	HP-2-ASED-TP-0217, Issue draft

2.2 Reference Documents

None

2.3 Other Documents

None

2.4 Acronyms & Abbreviations

See “as-run” procedure.

3 Main Observations and Problems Identified.

Several NCR´s have been raised or reoccurred during this run of the SPIRE reduced CFT.

3.1 Type 1.7 and 1.8 Packets (NCR-3327)

NCR has been validated during test and can be closed

3.2 CMD Failures 1.8 in POF3 (NCR-3324)

NCR has been validated during test and can be closed

3.3 Booting from Primary Partition (NCR-3204)

NCR has been validated during test and can be closed

3.4 OOL IST (NCR-3955)

NCR has been validated during test and can be closed

3.5 TC Sequence Errors (NCR-3513)

NCR has been validated during test and can be closed

3.6 Swap of channels (NCR-3725)

Channel PWM-B6 is still swapped, all others are repaired.

3.7 SPIRE CFT JFET Switch ON Voltage Level (NCR-3996)

During the VSS test the JFETs started with a higher voltage than anticipated. This problem has been overcome by procedure variation. The SVT procedures required a modification accordingly.

3.8 SPIRE CFT Pixel PSW-D15 with reversed slope (NCR-3999)

The lines of the photometer pixel PSW-D15 have been swapped on SPIRE request (see ACS, ref. HP-2-ASED-SD-0195) due to a reversed slope of the channel. This swap has been verified by a functional test thereafter, ref. HP-2-ASED-SD-0203, and was judged successful by SPIRE. The CFT results now show again a reversed slope on this channel. Investigations have been performed by SPIRE, but the cause for this recurring NC could not be identified. Since the pixel is only one out of 280 photometer channels and is of minor interest, use as is has been decided and closure of this NCR agreed.

3.9 SPIRE LPU wrong parameters for LCL in HPSDB (NCR-4000)

The LPU test was aborted before sending the first LCL command due to wrong initial status:

LCL 25 WMI2B565=Off and parameter WMI07565 =0.508 amps

LCL 26 WMAI2B565=Off and parameter WMAI07565 =0.881 amps

The HPSDB needs to be updated to implement the necessary corrections and the test will be repeated in conjunction with the next SPIRE functional test.

3.10 Procedure Changes

Updates and clarifications in the CFT procedure as required during the test execution were included by redlining. All necessary modification have bee reported in chapter 8.1, “Procedure Variation Summary”.

4 Conclusion

The SPIRE reduced Cold Functional Test under He1 conditions was successfully performed on the nominal side apart from the latch status tests.

The detailed evaluation of the test results has been performed by RAL, the SPIRE instrument supplier, in a separate test report which is attached as annex 3.

Initial results have been found satisfactory.

The SPIRE Reduced Cold Functional Test (CFT) has been performed using version SPIRE_MIB_FM_2.2.H1_PR integrated into the HPSDB version 3.3.1.30.

A number of Non-Conformance Reports (as listed above) were raised during the test, but none affected the test objectives.
All Spectrometer and Photometer packets were produced correctly.

4.1 Open Issues:

- SPIRE LPU functional tests prime/redundant which can be done in S/C vertical position, once the CDMS is updated with the current parameter (NCR-3661)

4.2 Requirements Verified

With the above test the requirement for the SPIRE CFT according to chapter 4.7.3 of “Test Specification for HERSCHEL Instruments FM tests performed at satellite level”, ref. H-P-2-ASP-TS-1083, has been partially verified. Peak-up Mode Test and SMEC Cold Functional Test (incl. Microvibration) need still to be performed.

5 Appendix 1: SPIRE Reduced CFT As-Run Procedure

(ref. HP-2-ASED-SD-0270 which includes HP-2-ASED-TP-0217, draft)

EADS Astrium HERSCHEL H-EPLM	ACTIVITY CONTROL	SHEET	HP-2-ASED-SD-0270 Iss: 01	Page 1 of 9

Location : FN	Title: SPIRE CFT in He1 prior to SVT		
Facility : Class 100	Model: PFM	Subsystem: SPIRE	Date: 03.03.2008
CI No.: 125 200	Test Conductor: A. Koppe	RAL: B. Swinyard / S. Sidher	NCR Ref:
	Prepared By: A. Koppe/S .Hamer		CIL No:

Scope: This SPIRE CFT procedure shall be executed prior to SVT in He1 conditions in order to ensure safe activation of JFETs. The test shall be executed on nominal side only.	**Procedures and reference documents:-** Ref.1: SPIRE FM Cold Functional Test Procedures: SPIRE-RAL-PRC-2398, iss. 2.4 Ref.2: HERSCHEL IST SPIRE INSTRUMENT COMMISSIONING: HP-2-ASED-TP-0217, draft Ref.3: HERSCHEL PCDU & CDMS Nominal Switch ON /OFF Procedure, HP-2-ASED-PR-070, Issue 1

Facilities required:	EGSE: CCS, I-EGSE	**Drawings:** none
Personnel required:	1 CCS Operator ; 1 Instrument Representative; 1 test Conductor; 1 QA	**MASS:**
Safety and Hazards:	Cryostat harness connected to CCU.	
Constraints:	Class 100 000 clean room EPLM mounted on SVM Level 3 Temperature between 10K and 15K during JFET checks	SPIRE OBS version: 2.2.H

EGSE CCS SW version: HPCCS 2.0-1219.	**On-Board S/W:** CDMS ASW: 3.1.3 ACMS ASW: 3.7
HPSDB: LI-1441 Iss 8 Draft	

Release AIT: 06/03/08	Release SE: collandin 6/3/08	Release PA/Safety:	Sign off (PA/QC/Team Leader)
Release Floor Manager: 06.3.08 16:15	Release SPIRE Instrument / RAL:		

No:	Activity	Proc/Drg	Results	Responsible & sign off
01	Verify that the SCOE cable connection according to Annex 2 is in place and inform Floor Manager that ACS will start	OK		
	START OF SPIRE CFT			
02	Configure EGSEs and switch ON SVM i.a.w. section 7.2.1 of Appendix 4 (Ref2)	OK		
03	SWITCH ON SPIRE PRIME according to section 7.2.2 of Appendix 4 (Ref2)	OK		
04	Perform SPIRE Prime CFT according to section 7.2.3 of Appendix 4 (Ref2)	OK		
05	SWITCH OFF SPIRE PRIME according to section 7.2.4 of Appendix 4 (Ref2)	OK		
06	Disconnect EGSEs and switch OFF SVM i.a.w. section 7.2.8 of Appendix 4 (Ref2)	N/A	SVM left ON for NIFTI SFT &.	
END	Inform Floor Manager ACS complete	-		

QA: R. Goossens

APPENDIX 1

Activity Control Sheet: Session Record

Session ID	Start Date/Time	End Date/Time	QA Approval
2008-03-07-05-33_herodmv-hpws22-REALTIME_SPIRECF	07/03/08 06.12	07/03/08 14:00	
ENV: HP_2_ASED_SD_0270_BEGIN_001			

Release AIT:	Release SE:	Release PA/Safety:	Sign off (PA/QC/Team Leader)
Release Floor Manager:			

APPENDIX 2

Actual **SCOE cable connection (to be confirmed by AIT)**

SCOE CABLES CONNECTION to HERSCHEL S/C

SKIN-01 PWR Panel (PCDU)

Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
BS Nom Power	SK01BJ09	PCDU	BS SCOE Cable Plugged	
BS Red Power	SK01BJ10	PCDU	BS SCOE Cable Plugged	
BDR1 AIT	SK01BJ11	PCDU	LPS SCOE Cable Plugged	
BDR2 AIT	SK01BJ12	PCDU	LPS SCOE Cable Plugged	
SA Nom Power	SK01AJ01	PCDU	POWER SCOE Cable Plugged	
SA Nom Power	SK01AJ02	PCDU	POWER SCOE Cable Plugged	
SA Nom Power	SK01AJ03	PCDU	POWER SCOE Cable Plugged	
SA Nom Power	SK01AJ04	Battery	←	EMC Dust Cap
SA Red Power	SK01AJ05	PCDU	POWER SCOE Cable Plugged	
SA Red Power	SK01AJ06	PCDU	POWER SCOE Cable Plugged	
SA Red Power	SK01AJ07	PCDU	POWER SCOE Cable Plugged	

SKIN-02 PWR Panel (ACC, CDMU, RCS, 1553 & Thruster)

	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-02	DMS 1553 Bus_A	J01	CDMU	Bus Monitor Cable Plugged	
SKIN-02	DMS 1553 Bus_B	J02	CDMU	Bus Monitor Cable Plugged	
SKIN-02	ACMS 1553 Bus_A	J03	ACC	ACMS SCOE Cable Plugged	
SKIN-02	ACMS 1553 Bus_B	J04	ACC	ACMS SCOE Cable Plugged	
SKIN-02	LV1/FCV 20N CMD S/A M	J05	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	LV2/FCV 20N CMD S/A R	J06	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	RCS Press/Tank Temp/PT Pwr	J07	ACC/PT&TH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster Temp M/LV1 Sts	J08	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	CDMU and ACC EEPROM reprogramming input	J09	ACC/CDMU		Flight Plug SK02P09 Plugged
SKIN-02	CDMU and ACC EEPROM reprogramming input	J10	ACC/CDMU		Flight Plug SK02P10 Plugged
SKIN-02	Thruster Temp R/LV2 Sts	J11	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters M	J12	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters R	J13	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Str1/2 On/Off Cmd M/Str1 Sts	J14	ACC/STR-1		ACMS Flight Plug SK02P14 Plugged

M. Mutz Fl. Mgr.
06.05.09
11:30

SKIN-02	Str1/2 On/Off Cmd R/Str2 Sts	J15	ACC/STR-2		ACMS Flight Plug SK02P15 Plugged
SKIN-02	Gyro A On/Off Cmd	J16	ACC/GYRO-E1		ACMS Flight Plug SK02P16 Plugged
SKIN-02	Gyro B On/Off Cmd	J17	ACC/GYRO-E2		ACMS Flight Plug SK02P17 Plugged
SKIN-03	TTC Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-03	Test point TC + protection jumper EPC1	SK03J01	XPND1/EPC1		Plastic cap
SKIN-03	Test point TC + protection jumper EPC2	SK03J02	XPND2/EPC2		Plastic cap
	RF LINK				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	RF link for antenna LGA1	N/A	LGA1	RF SCOE LGA1 Plugged	LGA1 Anechoic Cap
	RF link for antenna LGA2	N/A	LGA2	RF SCOE LGA2 Plugged	LGA2 Anechoic Cap
	RF link for antenna MGA	N/A	MGA	RF SCOE MGA Plugged	MGA Anechoic Cap
SKIN-04	ACMS Panel (RWE)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-04	RWL1 Sgn	J01	ACC/RWL-1		ACMS Flight Plug SK04P01 Plugged
SKIN-04	RWL2 Sgn	J02	ACC/RWL-2		ACMS Flight Plug SK04P02 Plugged
SKIN-04	RWL3 Sgn	J03	ACC/RWL-3		ACMS Flight Plug SK04P03 Plugged
SKIN-04	RWL4 Sgn	J04	ACC/RWL-4		ACMS Flight Plug SK04P04 Plugged
SKIN-05	GYR/QRS Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-05	CRS1 AOCS Sgn	J01	CRS-1/ACC		ACMS Flight Plug
SKIN-05	CRS2 AOCS Sgn	J02	CRS-2/ACC		ACMS Flight Plug
SKIN-05	GYRO RS422 / Test	J03	GYRO	ACMS SCOE Cable Plugged	
SKIN-05	CRS 1/2 Stimuli	J04	CRS-1,2	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn M	J05	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn M	J06	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn R	J07	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn R	J08	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-06	STR Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-06	STR1 Stimuli	J01	STR1	ACMS SCOE Cable Plugged	
SKIN-06	STR2 Stimuli	J02	STR2	ACMS SCOE Cable Plugged	
	UMBILICAL				
	Connector Function	Connector	S/C unit	SCOE CABLE	
	Power/Data	HU1J01	SYSTEM	SCOEs cable Plugged	
	Power/Data	HU2J01	SYSTEM	SCOEs cable Plugged	

06.02.08 18:35

APPENDIX 3

S/C Operational Status Sheet

S/C Lead Sign: HERSCHEL SAT AIT constrains sheet 06.03.08 15:42
Tel: ESTEC-54125

	Op	Comments	Non Op
CDMS			
CDMU	X		
1553 MIL-BUS A	X		
1553 MIL-BUS B	X		
PCS			
PCDU	X		
BAT		**BS SCOE connected**	X
Solar Array		**Not installed**	X
TCS	X		
TT&C	**X**		
MGA	X		
LGA1	X		
LGA2	X		
ACMS	**X**		
1553 MIL-BUS A	X		
1553 MIL-BUS B	X		
ACC	X		
RWL1,2,3,4	X		
SAS1	X		
SAS2	X		
AAD	X		
GYR	X		
STR1	X		
STR2	X		
CRS1	X		
CRS2	X		
RCS		**Simulated**	**X**
CCU	**X**	**CryoSCOE connected (except Temperature senor 315100-J06 for Telescope)**	
SPIRE	**X**		**X**
WUs			
FPU			
PACS	**X**		
WUs			
FPU			
HIFI	**X**		
WUs			
FPU			
VMC	**X**		
SREM	**X**		
CryoCover		**Not connected**	**X**

APPENDIX 4

Parts that are relevant for this Activity Control Sheet:

Ref2 **HP-2-ASED-TP-00217 Iss 1 Draft**

APPENDIX 4 TO ACS:SD-0270

AS RUN

Title: **IST Instrument Commissioning**
SPIRE FM Cold Functional Test

CI-No: 125200

Prepared by:	S. Hamer/TERMA AS	Date:	03.03.2008
Checked by:	S. Idler		
Product Assurance:	R. Stritter DRAFT		
Configuration Control:	W. Wietbrock		
Project Management:	W. Fricke		

Distribution: See Distribution List (last page)

Issue	Date	Sheet	Description of Change	Release
1.0	29.02.08	All	First Formal Issue	

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1 Scope

This document describes the set of Cold Functional Tests (CFTs) to be performed on the SPIRE FM Instrument for IST Instrument Commissioning (ref AD9 & AD6).

Specifically the functional test will verify the correct functioning of certain SPIRE subsystems in Hel or Hell conditions. Both redundancies are tested within this procedure.

Constraints

- This procedure requires the presence of SPIRE personnel as the I-EGSE will be required to assess the results online as part of the pass/fail criteria.
- Before carrying out the next procedure within the test sequence always ask for the go ahead by the SPIRE staff.
- Chapter 4 of this document specifies the sequence to be executed.
- The last row in a functional procedure tables should be used to record the overall Pass/Fail result of each test.

This first draft issue of the procedure is to be used for JFET health check prior to SVT1 as required by RAL/ESA.

1.1 Objective

The objective of the test is to functionally check FM instrument as much as feasibly possible in Hel or Hell conditions in an AIT environment.

1.2 Test Flow

This test flow is structured to reflect nominal operations of the FM SPIRE.

The flow is as follows:

1. Power on and configure SPIRE I-EGSE for test
2. Power on and configure SVM for test including CCU
3. Power on NOMINAL SPIRE Prime DPU & DRCU and enable Mil1553B-bus interface
4. Run Nominal CFT Procedures
5. Power off MCU Prime
6. Disable Mil1553B-bus interface and Power off SPIRE Prime DRCU & DPU

7. Repeat Steps 3 – 6 for Spire Redundant CFT Procedures
8. Power off SVM including CCU
9. Switch off all EGSE

2 Documents/Drawings

2.1 Applicable Documents

AD 1	FM SPIRE PFM Final Electrical Integration Procedure	HP-2-ASED-TP-166
AD 2	Herschel PCDU & CDMS Nominal Switch On/Off Procedure	HP-2-ASED-PR-070
AD 3	Herschel SAT Emergency Switch Off Procedure	HP-2-ASED-PR-071
AD 4	PA Plan	HP-2-ASED-PL-0007
AD 5	I-EGSE Switch ON/OFF Procedure	TBI
AD 6	Test Specification for Herschel Instrument AVM & FM Tests Performed at Satellite Level, Issue 2	H-P-2-ASP-TS-1083
AD 7	H-P GDIR	H-P-1-ASPI-SP-0027
AD 8	SPIRE I-EGSE Set-Up, Issue 2.1	SPIRE-RAL-DOC-002841
AD 9	Herschel Integrated Satellite Test Specification, Issue 5	H-P-2-ASP-SP-0939

2.2 Reference Documents

RD 1	Herschel Planck Central Checkout System System User Manual	H-P-4-TE-MA-0010
RD 2	SPIRE Cold Functional Test Procedures, Iss. 2.4	SPIRE-RAL-PRC-2398
RD 3	Herschel CDMU ASW S/W Interface Control Document	H-P-4-SSF-IC-0001
RD 4	Herschel CDMU BSW S/W Interface Control Document	H-P-4-SES-NT-0076
RD 5	SPIRE IID-B	SCI-PT-IIDB/SPIRE-02124
RD 6	SPIRE Functional Test Specification Iss. 1.4	SPIRE-RAL-DOC-001652

RD 7	SPIRE Instrument User Manual Iss. 1.0	SPIRE-RAL-PRJ-002395
RD 8	H/P OBT-UTC Time Synchronisation Technical Note Iss. 1.3	PT-CMOC-OPS-TN-6604-OPS- OGH

2.3 Other Documents

None

2.4 Acronyms & Abbreviations

1553	MIL-STD-1553B conform communication interface
AAD	Attitude Anomaly Detector
ACC	ACMS Control Computer
ACMS	Attitude Control and Measurement Subsystem
AD	Applicable Document
AIR	ACC In Reconfiguration
AIT	Assembly, Integration and Test
AIV	Assembly, Integration and Verification
APID	Application Process ID
ASW	Application Software
AVM	Avionics Model
BOLC	BOLometer Control unit (PACS)
BSW	Basic Software
CBH	Catalyst Bed Heater
CCS	Central Check-out System
CCSDS	Consultative Committee for Space Data Systems
CDMU	Control and Data Management Unit
CDMS	Control and Data Management Sub-system
CFT	Cold Functional Test
CIR	CDMU In Reconfiguration
CLCW	Command Link Control Word
CLTU	Command Link Transmission Unit
CPDU	Command Pulse Distribution Unit
CRS	Coarse Rate Sensor

CTR	Central on board Reference Time
DCU	Detector Control Unit (SPIRE)
DEC	Detectors Electronics Control unit (PACS)
DMC	Detector and Mechanism Control unit (PACS)
DPU	Digital Processing Unit
DRCU	Detector Readout & Control Unit (SPIRE)
EEPROM	Electrically Erasable PROM
EGSE	Electrical Ground Support Equipment
FCL	Fold-back Current Limiter
FCU	FPU Control Unit (Spire)
FCV	Flow Control Valves
FDIR	Failure Detection, Isolation, and Recovery
FPU	Focal Plane Unit
GDIR	General Design and Interface Requirement
GRP	Group Heaters Switch
HBR	High Bit Rate
HL/HLC	High Level command
HP/HPC	High Priority commands
HPLM	Herschel PayLoad Module
HPSDB	Herschel Planck System Data Base
HW	Hardware
i.a.w.	In accordance with
I/F	InterFace
I/O	Input/Output
ICD	Interface Control Document
IST	Integrated System Test
LCL	Latching Current Limiter
LV	Latching Valves
LBR	Low Bit Rate
MAP	Multiplexed Access Point
MBR	Medium Bit Rate
MCU	Mechanisms Control Unit (SPIRE)

MEC	Mechanisms Electronics Control unit (PACS)
ML 16	Memory Load command (ML 16)
MM	Memory Module
MOIS	Mission Operations Information System
MTL	Mission Timeline
NRZ-L	Non Return to Zero – Litton
OBCP	On-Board Control Procedure
OBDH	On-Board Data Handling
OBMF	On-Board Monitoring Function
OBRT/OBT	On-Board Reference Time
OIRD	Operation Interface Requirement Document
PACS	Photodetector Array Camera & Spectrometer
P/L	Payload
PCDU/PCS	Power Control Distribution Unit/Power Control Subsystem
PM	Processor Module
PROM	Programmable Read Only Memory
PSK	Phase Shift Keying
RA	Rate Anomaly
RAM	Random Access Memory
RCS	Reaction Control Subsystem
RD	Reference Document
RF	Radio Frequency
RM	Reconfiguration Module
RT	1553 Remote Terminal
RTU	RT Unit
RTA	RTU
RWL	Reaction Wheel Assembly
SA	1553 Remote Terminal Sub Address
SAS	Sun Acquisition Sensor
SCOE	Special Check-out Equipment
SCU	Subsytems Control Unit (SPIRE)
SIR	S/C In Reconfiguration

SIT	Subsystem Integrated Test
SP	Sun Pointing
SPIRE	Spectral & Photometric Imaging Receiver
SPU	Signal Processing Unit (PACS)
SSMM	Solid State Mass Memory
STR	Star Tracker
SVM	Service Module
SW	Software
TAI	International Atomic Time
TC	TeleCommand
TFG	Transfer Frame Generator
TM	TeleMetry
TTC	Telemetry Tracking & Command subsystem
TTR	Telemetry Telecommand and Reconfiguration
UFT	Unit Functional Test
VC	Virtual Channel
WD	Watchdog

3 Configuration

3.1 Satellite Configuration

The test requires use of the FM SVM powered on in its basic test mode (i.e. quick switch on (PCDU & CDMS) in accordance with AD 2 plus CCU connected to cryostat temperature and pressure sensors. Note this also means that the cryostat valves (commandable from the CCS) may also be connected therefore this has to be considered as a SAFETY critical area to be addressed in section 5.

SPIRE FM units will be powered ON as per this procedure and assumes that FPU has already been successfully integrated to the warm units.

3.2 EGSE Configuration

This test requires the EGSE to be configured and elements powered on in accordance with AD 2.

I-EGSE shall be configured and connected to the HPCCS in accordance with AD 5 & AD 8.

3.3 Set-up

SPIRE Test Scripts for the test must be loaded on to the HPCCS and checked in prior to start of test.

4 Test Sequence

The following SPIRE test scripts are required for execution on the HPCCS they do NOT reflect the test steps or order in which the steps are executed (the latter is defined in the order of the procedure):

No.	Tcl Script Name	Comment	Confirmed
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
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18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			
29.			

No.	Tcl Script Name	Comment	Confirmed
30.			
31.			
32.			
33.			
34.			
35.			
36.			
37.			
38.			
39.			
40.			
41.			
42.			
43.			
44.			
45.			
46.			
	REDUNDANT UNIT SCRIPTS		
47.			
48.			
49.			
50.			
51.			
52.			
53.			
54.			
55.			
56.			
57.			
58.			
59.			
60.			
61.			
62.			
63.			

No.	Tcl Script Name	Comment	Confirmed
64.			
65.			
66.			
67.			
68.			
69.			
70.			
71.			
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73.			
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89.			
90.			
91.			
92.			
93.			

The SPIRE I-EGSE will be running the following software for the test:

I-EGSE Software	Version	Comment
SPIRE MIB version	2.2-G6_PR	
SCOS version	2.3e Patch 5	

The HPCSS HPSDB must also include the same SPIRE MIB version.

5 Conditions

5.1 Personnel

Responsibility	Name / Organisation
Test Director	B. COLLAUDIN
Test Conductor	A. KOPPE
EGSE Operator	S. HAMER
PA Responsible	D. HENDRY
Instrument Representative	B. SWINYARD
Customer Representative	B. COLLAUDIN
ESA Representative	K. GODEY

5.2 Environmental

The actual clean room environmental conditions for the test shall be recorded below.

Clean Room Conditions	Nominal	Actual
Clean Room Class	class 100000 or better	✓
Temperature	22°C ± 3°C	✓
Rel. Humidity	40 % - 60 %	✓
Pressure	Ambient	✓

S/C Environmental	Actual
S/C Orientation	vertical
Cryostat Status (Hel/Hell)	He I
Cryostat Level 0 Temp	4.30 K
Cryostat Level 1 Temp	5.5 - 6.0 K
Cryostat Level 2 Temp	10.45 K
Cryostat Level 3 Temp	10.65 - 11.4 K

5.3 General Precautions and Safety

Non-test specific precautions and safety considerations are detailed in section 5.3 of AD 2. Specific safety issues and general precautions for the tests to be performed are detailed in the following sections.

5.3.1 General Safety Requirements, Precautions

In the event of unrecoverable anomaly requiring emergency switch off of the satellite, the switch off shall be performed in accordance with AD 3.

5.3.2 ESD constraints

Normal ESD constraints are to be observed during the test.

5.3.3 Cryo Specific Safety Requirements

During the test the CCU shall be connected to the Cryosat which includes the valves. Although, no valve operation is performed in this test, all Cryo specific safety requirements shall be considered when running this procedure. AD Tbd refers.

5.3.4 Special QA Requirements

None.

5.4 GSE

Non-test specific GSE details are provided in section 5.4 of AD 2. Specific GSE needs for the tests to performed are detailed in the following sections.

5.4.1 MGSE

None.

5.4.2 CVSE

None.

5.4.3 EGSE

The I-EGSE is required for this test and will be connected to the HPCCS in accordance with AD 5.

5.4.4 OGSE

None.

5.4.5 Special Equipment

None.

6 Verification Requirements and Test Criteria

This is a functional check of all SPIRE PFM subsystems in Hel or Hell conditions and AIT configuration as per AD9 and AD6.

Functional performance and status parameter actual values recorded will be checked during the test and must be the same as the nominal status value indicated.

The test will only be deemed successful once all offline analysis of the results has been performed. Typically, the PTR will be held before completion of this activity and therefore only a preliminary assessment of the test success can be provided to allow disconnection of any specific GSE required for the test and which needs to be removed before further activities can be performed.

Enter Start Date|Time:			

7 Test Procedure

7.1 Initial EGSE and Satellite Configuration for the Test

The Spire FM Final Integration according to the Test Procedure ref. AD 1 must be successfully completed before the execution of this procedure.

The EGSE and Satellite must be configured according to AD 2 prior to start of test.

In case of anomaly on SPIRE requiring immediate switch off as directed by SPIRE responsible supporting the test section 7.2.9 shall be executed.

In the event of emergency the Satellite SHALL be switched down according to AD 3.

Enter Start Date|Time:	07/03/08 -	05:30	

7.2 Step by Step Procedure

Test Location:	ESTEC / HYDRA
Test Session Id:	2008-03-07-05-33 -herc dmu HRWS22 REALTIME SPIRE CFT
Test Environment:	HP_2_ASED_SD-0270-BEGIN-001

7.2.1 EGSE & Satellite Switch On

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Satellite & EGSE Switch On						
1	Confirm I-EGSE physically connected to HPCCS	OK		OK		✓	
2	If not already on, switch on HPCCS, SCOEs and Satellite/SVM and configure into Basic Test Mode i.a.w. AD 2 Section 7.1 to 7.5	OK		OK		✓	
3	Confirm that EGSE and Satellite are in the correct configuration as per AD 2	OK		OK		✓	
4	From HPCCS power ON CCU A & CCU B by executing test script: **K102999ECVT001_ASDGENCCU_ABPWRON**	OK		OK		✓	
5	From HPCCS enable Monitoring Mode 1 (512sec cycle) for CCU A & B by executing test script:						

Enter Date/Time:	07/03/08.	06:12.	Sign Off:	

Enter Start Date|Time:	07/03/08	06:20	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	K102999ECVT001_ASDGENCCU_MnEBOTH1	OK		OK		✓	
6	Switch on & configure SPIRE I-EGSE i.a.w. **AD5 & AD 8**	OK		OK		✓	
7	Confirm SPIRE I-EGSE is in the correct configuration as per AD5 & AD 8	OK		OK		✓	
8	From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE **connect HSPIREEGSE**	OK		OK		✓	
9	Confirm from HPCCS and SPIRE I-EGSE that the connection has been established	YZS29940 = CONNECTED		CONNECTED		✓	
10	Verify that I-EGSE is receiving CCU Cryo packets	OK					
11	On HPCCS start the following test script: **ALL_SubscribeParams.tcl**	OK		OK		✓	
12	Verify HPCCS-IEGSE connection by sending test command: **YC00X066** From the manual command stack (repeater value of "0")	OK		OK		✓	
13	If required load Synoptics INSTRUMENTS on HPCCS to display SPIRE status overview			N/A		✓	
	START OF SPIRE CFT						

Enter Date/Time:	07/03/08	06:24	Sign Off:	

Enter Start Date|Time:	07/03/08	06:25	

7.2.2 *Switch ON SPIRE PRIME*

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE DPU and DRCU are powered.

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	On HPCCS start Packet History displays for the following APIDs:1280,1282	OK	OK		✓	
2.	From the HPCCS test conductor console start the test script to power on SPIRE Prime: **S102999SCVT031_ASDCFTSPIR_PWR_ON_P**	OK	OK	AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL	✓	
3.	On HPCCS when prompted: "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES	YES		✓	

Enter Date/Time:	07/03/08.	06:26	Sign Off:	

Enter Start Date|Time:	07/03/08	06:26	

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	If **YES** is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below.					
4.	On HPCCS when prompted: "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue" Select OK	OK	OK	**AND: SA_1_559**		
5.	If I-EGSE connected when prompted on HPCCS, perform check requested then select **OK**: "Check IEGSE Time Consistent - OK to continue when RAL confirm"	OK	OK			
6.	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N	 Not refreshing Not incrementing	 OK OK			

Enter Date/Time:	07/03/08	06:31	Sign Off:	

Enter Start Date|Time:	07/03/08	06:32	

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	Select OK to continue	OK	OK			
7.	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters: THSK TM2N Select OK to continue	 Refreshing @ 1Hz Incrementing by 1 @ 1Hz OK	 OK OK OK	AND: SA_1_559		
8.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT031_ASDCFTSPIR_PWR_ON_P** it will prompt: "Set Bus Profile Back to Original Setting?" Select NO	NO	NO			
9.	At the prompt: "Bus Profile left unchanged" Select OK to continue	OK	OK			
10.	Verify HK TM packets are being received on	OK	OK			

Enter Date/Time:	07/03/08	06:35	Sign Off:	

Enter Start Date|Time:	07/03/08	.	

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	APIDs 1280 & 1282					
	SPIRE DPU & DRCU powered					

Enter Date/Time:	07/03/08	06:35.	Sign Off:	

Enter Start Date|Time:	07/03/08	06:36	

7.2.3 *Cold Functional Tests - Nominal*

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Temporary Procedure for CFT prior to SVT1						
1	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.2.3 through 4.2.19 attached to this draft procedure	OK		OK.		SWL	
2	**Prior to performing next step verify that Level 3 temperature is between 10K and 15K (sensors T246 & T247)**	OK		OK		SWL	
3	Record Temperatures: T246: (KD223302 if connected to CCU) T247: (KD223303 if connected to CCU)	 >10K - <15K >10K - <15K		 10.5K 11.47K	@ 08:33 UTC	SWL	
4	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.2.20 through 4.2.30 attached to this draft procedure	OK		OK.		SWL	
5	Record Temperatures: T246: (KD223302 if connected to CCU) T247: (KD223303 if connected to CCU)	 >10K - <15K >10K - <15K		 10.75K 12.12K	@ 14:58 UTC	SWL	
6	**Inform Cryo Engineers that Level 3 temperature no longer needs to be maintained between 10K and 15K**	OK		OK		SWL	
7	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.2.31 through 4.2.32 attached to this draft procedure	OK		OK		SWL	
	End of Temporary Procedure						

NCR-PVS2 PVS3.

Enter Date/Time:	07/03/08	13:53	Sign Off:	

Enter Start Date|Time:	07/03/08	13:54	

7.2.4 *Switch OFF SPIRE PRIME*

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: **S102999SCVT032_ASDCFTSPIR_PWR_OFF_P**	OK	OK		SM	
2.	On HPCCS when prompted: "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES	YES		SM	
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.					
3.	During Switch OFF of SPIRE the following (5,1) and (5,4) event messages on APID 1280 may be expected and do not indicate a problem: a) EVID 1313 No_MCU_Response_Error b) EVID 21773 ALARM_LSMCU_DEAD (13:44)		Seen OK		SM	

Enter Date/Time:	07/03/08	14:00	Sign Off:	

Enter Start Date|Time:	07/03/08		

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
4.	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N	 Not refreshing Not incrementing	 OK OK	AND: SA_1_559	SM	
5.	Select OK to continue	OK	OK		SM	
6.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT033_ASDCFTSPIR_PWR_OFF_P** it will prompt: "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"					
7.	Select OK to continue	OK	OK		SM	
8.	On HPCCS stop Packet History displays for the following APIDs:1280,1282	OK	OK		SM	
	SPIRE PRIME OFF					

Enter Date/Time:	09/03/08	14:02	Sign Off:	

Enter Start Date|Time:			

7.2.5 *Switch ON SPIRE REDUNDANT*

During power on of SPIRE a number of soft/hard OOLs are reported due to the sequential switch on of the units. This is expected and will clear when SPIRE DPU and DRCU are powered.

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	On HPCCS start Packet History displays for the following APIDs:1281,1283	OK				
2.	From the HPCCS test conductor console start the test script to power on SPIRE Redundant: **S102999SCVT033_ASDCFTSPIR_PWR_ON_R**	OK		AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL		
3.	On HPCCS when prompted: "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	If **YES** is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below.					
4.	On HPCCS when prompted: `"Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue"` **Select OK**	OK		**AND: SA_1_559**		
5.	If I-EGSE connected when prompted on HPCCS, perform check requested then select **OK**: `"Check IEGSE Time Consistent - OK to continue when RAL confirm"`	OK				
6.	On HPCCS when prompted: `"Check Telemetry No Longer Updating - OK to continue"` Check that parameters: THSK TM2N	 Not refreshing Not incrementing				

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	Select OK to continue	OK				
7.	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters: THSK TM2N Select OK to continue	 Refreshing @ 1Hz Incrementing by 1 @ 1Hz OK		**AND: SA_1_559**		
8.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT033_ASDCFTSPIR_PWR_ON_R** it will prompt: "Set Bus Profile Back to Original Setting?" Select NO	NO				
9.	At the prompt: "Bus Profile left unchanged" Select OK to continue	OK				
10.	Verify HK TM packets are being received on	OK				

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	APIDs 1281 & 1283					
	SPIRE DPU & DRCU Redundant powered					

Enter Start Date|Time:			

7.2.6 *Cold Functional Tests – Redundant*

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Temporary Procedure for CFT prior to SVT1						
1	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.3.3 through 4.3.19 attached to this draft procedure	OK					
2	**Prior to performing next step verify that Level 3 temperature is between 10K and 15K (sensors T246 & T247)**	OK					
3	Record Temperatures: T246: (KD223302 if connected to CCU) T247: (KD223303 if connected to CCU)	 >10K - <15K >10K - <15K					
4	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.3.20 through 4.3.30 attached to this draft procedure	OK					
5	Record Temperatures: T246: (KD223302 if connected to CCU) T247: (KD223303 if connected to CCU)	 >10K - <15K >10K - <15K					
6	**Inform Cryo Engineers that Level 3 temperature no longer needs to be maintained between 10K and 15K**	OK					
7	Perform SPIRE Prime Cold Functional Tests as per RD2 Sections 4.3.31 through 4.3.32 attached to this draft procedure	OK					
	End of Temporary Procedure						

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.7 *Switch OFF SPIRE REDUNDANT*

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: **S102999SCVT034_ASDCFTSPIR_PWR_OFF_R**	OK				
2.	On HPCCS when prompted: "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.					
3.	During Switch OFF of SPIRE, the following (5,1) and (5,4) event messages on APID 1281 may be expected and do not indicate a problem: c) EVID 1313 No_MCU_Response_Error d) EVID 21773 ALARM_LSMCU_DEAD					

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
4.	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N	 Not refreshing Not incrementing		**AND: SA_1_559**		
5.	Select OK to continue	OK				
6.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT035_ASDCFTSPIR_PWR_OFF_R** it will prompt: "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"					
7.	Select OK to continue	OK				
8.	On HPCCS stop Packet History displays for the following APIDs:1281,1283	OK				
	SPIRE REDUNDANT OFF					

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:	07|03|08		

7.2.8 Satellite & EGSE Switch Off

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	Satellite & EGSE Switch Off						
	Initial Conditions: Nominal & Redundant SPIRE warm units OFF						
1	On HPCSS terminate **ALL_SubscribeParams.tcl** test script.	OK		Left Running			
2	From HPCCS Test Conductor console issue command to disconnect from SPIRE I-EGSE **disconnect HSPIREEGSE**	OK		OK			
3	Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful	OK		OK			
4	Switch OFF I-EGSE i.a.w. AD 5	OK		N/A			
5	From HPCCS disable Monitoring Mode 1 (512sec cycle) for CCU A & B by executing test script: **K102999ECVT001_ASDGENCCU_MnDBOTH1**	OK		Left ON for next test			
6	From HPCCS power OFF CCU A & CCU B by executing test script: **K102999ECVT001_ASDGENCCU_ABPWROFF**	OK		Left ON for next test			
7	Switch OFF Satellite/SVM, HPCCS and SCOEs i.a.w. procedure AD 2 Sections 7.7 to 7.11	OK		Left ON for next test			
8	Confirm both Satellite and EGSE powered down	OK		N/A			
	End Conditions: Satellite and EGSE OFF						
	END OF TEST						

Enter Date/Time:	07|03|08		Sign Off:	

Enter Start Date|Time:			

7.2.9 SPIRE SAFE Switch Off

The following procedure describes the necessary steps to safely switch off SPIRE when directed by RAL personne if an anomaly should occur.

Version	2.4
Date	6th December 2007
Purpose	To switch OFF the SPIRE instrument if an anomaly should occur
Initial configuration	SPIRE can be in ANY configuration as specified in the test sequence in section 4.1
Final configuration	SPIRE is OFF
Preconditions	• SPIRE FM DPU is electrically integrated with the Herschel Satellite • SPIRE MIB is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	~5-8 minutes
Pass/Fail Criteria	SPIRE is OFF. All instrument subsystems are completely powered OFF.

Enter Start Date|Time:			

Step	Description	Parameter - Unit	Expected value before/after	Actual value before/after
1.	Execute Procedures: ▪ SPIRE-IST-COLD-PDET-OFF-P/R ▪ SPIRE-IST-COLD-BSM-OFF-P/R	PLIABITSAT PSWJFETSTAT PMLWJFETSTAT CHOPSENSPWR JIGGSENSPWR	- / 0 - / 0 - / 0 - / 0 - / 0	
2.	Execute Procedures: ▪ SPIRE-IST-COLD-SDET-OFF-P/R ▪ SPIRE-IST-COLD-SMEC-OFF-P/R	SLIABITSAT SPECJFETSTAT SMECENCPWR SMECLVDTPWR	- / 0 - / 0 - / 0 - / 0	
3.	Execute Procedures: ▪ SPIRE-IST-COLD-MCU-OFF-P/R ▪ SPIRE-IST-COLD-SCU-OFF-P/R	MCUBITSTAT SCUTEMPSTAT SUBKSTAT	- / 0 - / 0 - / 0	
4.	Execute Procedure: ▪ SPIRE-IST-COLD-DRCU-OFF-P/R	TM2N THSK	- / Not updating	
5.	Execute Procedure: ▪ SPIRE-IST-COLD-DPU-OFF-P/R	—	—	

Enter Date/Time:			Sign Off:	

8 Summary Sheets

8.1 Procedure Variation Summary

	Test Change	Curr. No.: 1. Date 07/03/08 Page 1 of	
Test designation: SPIRE CFT (JFET)	Test Procedure: ACS SD-270	Issue: 1	Rev.: –
Test step changed: PRC-2398 Section 4.2.14, Step 1	Reason for Change: Operator Error.		

Step 2 executed by accident before step 1 ~~Exec~~

After completion of Step 2 test script execution the section was restarted from step 1 – OK.

Prepared by: S. HAMER	Resp. Test Leader	Project Engineer
PA/QA	Prime	Customer

Table 8.1-1: Procedure Variation Sheet

8.1 Procedure Variation Summary

	Test Change	Curr. No.: 2 Date 07/03/08 Page 1 of 1	
Test designation SPIRE CFT (JFET)	Test Procedure ACS SD-270	Issue 1	Rev. –
Test step changed PRC-2398 Section 4.2.26	Reason for Change See Below		

JFETs 1 & 2 appear not to have switched ON: switch off spectrometer & switch on again:

1) Run script SPIRE-IST-COLD-SDET-OFF-P:- OK
3) Repeat above step (section 4.2.26) - NOK
2) Record Level 3 temperatures - OK
4) Skip steps PRC-2398 sections 4.2.27 & 4.2.28.
Perform PRC-2398 section 4.2.29 to see if this will switch on JFETs (increases supply voltage): SPIRE-IST-COLD-SPEC-VSS-P. OK
5) Restart DCU Science by manual TC: SCD06505, SPD4N505 = 0x843E0001
6) Stop DCU Science & Flush FIFO SCD06505, SPD4N505 = 0x843E0000 SCD01505 with param 0x1000
7) Continue from section 4.2.27

Prepared by: S HAMER	Resp. Test Leader	Project Engineer
PA/QA D W Henday	Prime	Customer

Table 8.1-1: Procedure Variation Sheet

8.1 Procedure Variation Summary

	Test Change	Curr. No.: 3 Date 07/03/08 Page 1 of	
Test designation: SPIRE CFT (JFET)	Test Procedure: ACS SD-270	Issue: 1	Rev.: –
Test step changed: PRC-2398 Section 4.2.30	Reason for Change: Switch on Spectrometer JFET Problem.		

After completion of section 4.2.30:
1) RAL to update I-EGSE database with new parameters for JFET switch on. – OK
2) Repeat sections 4.2.26 – 4.2.30
   2a) 4.2.26 – OK
   2b) 4.2.27 – OK
   2c) 4.2.30 – OK

Prepared by: S. HAMER	Resp. Test Leader	Project Engineer
PA/QA R. Goossens	Prime	Customer

Table 8.1-1: Procedure Variation Sheet

8.3 Sign-off Sheet

	Date	Signature
Test Manager	7/3/08	
Operator	07/03/08.	
PA Responsible	07/03/08	
ESA Representative	07-03-2008	

8.2 Non Conformance Report (NCR) Summary

NCR - No.	NCR - Title	Date	Open Closed	PA sig.
	Spectrometer JFETs not switching on	07/03/08	open	

Table 8.2-1: Non-Conformance Record Sheet

END OF DOCUMENT

	Name	Dep./Comp.		Name	Dep./Comp.
X	Alberti von Mathias Dr.	ASG22		Schweickert Gunn	ASG22
	Baldock Richard	FAE12	X	Sonn Nico	ASG51
	Barlage Bernhard	AED13		Steininger Eric	AED32
	Bayer Thomas	ASA42	X	Stritter Rene	AED11
	Brune Holger	ASA45		Suess Rudi	OTN/ASA44
	Edelhoff Dirk	AED2		Wagner Klaus	ASG22
	Fehringer Alexander	ASG13	X	Wietbrock Walter	AET12
X	Fricke Wolfgang Dr.	AED 65		Wöhler Hans	ASG22
	Geiger Hermann	ASA42		Wössner Ulrich	ASE252
	Grasl Andreas	OTN/ASA44	X	Theunissen Martijn/Dutch Space	ASA43
	Grasshoff Brigitte	AET12	X	Martin Olivier	ASA43
X	Hamer Simon	Terma			
X	Hendry David	Terma			
	Hengstler Reinhold	ASA42			
	Hinger Jürgen	ASG22			
X	Hohn Rüdiger	AED65			
	Hölzle Edgar Dr.	AED32			
	Huber Johann	ASA42			
	Hund Walter	ASE252			
	Idler Siegmund	AED312			
	Iványi von András	FAE12			
	Jahn Gerd Dr.	ASG22			
	Kalde Clemens	ASM2			
	Kameter Rudolf	OTN/ASA42			
	Kettner Bernhard	AET42			
	Knoblauch August	AET32	X	Alcatel Alenia Space Cannes	AAS-F
X	Koelle Markus	ASA43		Alcatel Alenia Space Torino	AAS-I
X	Koppe Axel	AED312	X	ESA/ESTEC	ESA
X	Kroeker Jürgen	AED65			
X	La Gioia Valentina	Terma		**Instruments:**	
	Lang Jürgen	ASE252		MPE (PACS)	MPE
	Langenstein Rolf	AED15	X	RAL (SPIRE)	RAL
	Langfermann Michael	ASA41		SRON (HIFI)	SRON
X	Maukisch Jan	ASA43			
X	Much Christoph	ASA43			
	Müller Jörg	ASA42		**Subcontractors:**	
X	Müller Martin	ASA43		Alcatel Alenia Space Antwerp	ABSP
	Peltz Heinz-Willi	ASG13		Austrian Aerospace	AAE
	Pietroboni Karin	AED65		Austrian Aerospace	AAEM
	Platzer Wilhelm	AED2		BOC Edwards	BOCE
	Reichle Konrad	ASA42		Dutch Space Solar Arrays	DSSA
	Runge Axel	OTN/ASA44		EADS Astrium Sub-Subsyst. & Equipment	ASSE
	Schink Dietmar	AED32		EADS CASA Espacio	CASA
	Schlosser Christian	OTN/ASA44		EADS CASA Espacio	ECAS
	Schmidt Rudolf	FAE12		European Test Services	ETS
	Schmidt Thomas	ASA42		Patria New Technologies Oy	PANT
	Schuler Günter	ASA42		SENER Ingenieria SA	SEN

APPENDIX 5

Parts that are relevant for this Activity Control Sheet:

Ref1 SPIRE-RAL-PRC-2398, Iss 2.4

Appendix 5 to ACS: SD-0270

4.2.3 Procedure SPIRE-IST-COLD-FUNC-SCU-02-P

Version	2.4
Date	6th December 2007
Purpose	SCU Nominal Science Contents Check PRIME
Initial configuration	SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced
Final configuration	Unchanged
Preconditions	• **SPIRE-IST-COLD-DPU-ON-P** and **SPIRE-IST-COLD-DRCU-ON-P** procedures have been executed. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • I-EGSE is up and running • DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	HK parameters have the expected values

Procedure Steps:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-SCU-02-P.tcl	SCUFRAMECNT TM5N	0/31 0x3FFF/1	0/31 0x3FFF/1	
Test Result (Pass/Fail):					

4.2.4 Procedure SPIRE-IST-COLD-FUNC-SCU-03-P

Version	2.4
Date	6th December 2007
Purpose	SCU DC thermometry check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	8 minutes
Pass/Fail Criteria	SCU DC thermometry channels show temperature readings according to the actual instrument temperature

Procedure Steps:

06:45 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-SCU-03-P.tcl	—	—	— OK	
2	**Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm**	—	—	—	
3	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0/0xFFFF/0xFFFF	0x FFFF	
4	If the instrument is at He I temperatures check the values of SCU DC thermometry channels.	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	(All Values TBC) ~4.2K ~4.4K ~4.3K ~4.2K ~4.8K ~4.2K ~4.2K ~4.8K ~4.8K ~4.7K ~4.8K ~4.8K ~4.8K ~4.7K ~4.7K ~4.8K	OK	✓

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
5	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	Ok	
6	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	
Test Result (Pass/Fail):					

06:49

4.2.5 Procedure SPIRE-IST-COLD-FUNC-SCU-06-P

Version	2.4
Date	6th December 2007
Purpose	SCU AC thermometry check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail Criteria	SCU AC thermometry channel shows temperature readings according to the actual instrument temperature

Procedure Steps:

06:50

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-SCU-06-P.tcl	—	—	— OK	
2	**Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm**	—	—	— OK	
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	0/1/1	OK	
4	If the instrument is at He I temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~4K	OK	
5	If the instrument is at He II temperatures check the value of SCU AC thermometry channel.	SUBKTEMP	~1.7K	OK	
6	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	
Test Result (Pass/Fail):					

06:51

4.2.6 Procedure SPIRE-IST-COLD-FUNC-SCU-07-P

Version	2.4
Date	6th December 2007
Purpose	Sorption Cooler Heater Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Constraints	**This test should not be performed at He II temperatures, unless specifically instructed to do so by the I-EGSE staff.**
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	Sorption cooler heat switches and pump heater show expected voltages

Procedure Steps:

06:53 07/03/08

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

06:56

4.2.7 Procedure SPIRE-IST-COLD-FUNC-PCAL-01-P

Version	1.0
Date	6th December 2007
Purpose	PCAL Characterisation Check (PRIME)
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	Unchanged
Constraints	**This test should only be performed at He I or He II temperatures**
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	PCAL voltage and current agree with expected values

Procedure Steps: 06:59, 07/03/08.

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

Final Configuration: Unchanged 07:08

4.2.8 Procedure SPIRE-IST-COLD-FUNC-SCAL-01-P

Version	1.0
Date	6th December 2007
Purpose	SCAL Characterisation Check (PRIME)
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	Unchanged
Constraints	**This test should only be performed at He I or He II temperatures. If the test is to be performed at He II temperature then please confirm with I-EGSE staff first.**
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	18 minutes
Pass/Fail criteria	SCAL2 and SCAL4 voltage and currents agree with expected values

Procedure Steps: 07:05. 07/03/08.

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

07:25.

4.2.9 Procedure SPIRE-IST-COLD-FUNC-MCU-01-P

Version	2.4
Date	6th December 2007
Purpose	MCU (PRIME) Boot Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	MCU voltages and board temperatures show expected 'ON' values

Procedure Steps: 07:38 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-MCU-01-P.tcl	—	—	Ok	SNA
2	Check that the MCU is booted up successfully	MCUBITSTAT	0/1/1	OK	SNA
3	Check MCU HK parameter values and ensure that the values are refreshing	MCUP5V MCUP14V MCUM14V MCUP15V MCUM15V MCUMACTEMP MCUSMECTEMP MCUBSMTEMP	~ 5.0 ± 0.2V ~ 14.0 ± 0.5V ~ -14.0 ± 0.5V ~ 15.0 ± 0.5V ~ -15.0 ± 0.5V ~300K ~300K ~300K	Ok	SNA
Test Result (Pass/Fail):					

07:40

4.2.10 Procedure: SPIRE-IST-COLD-FUNC-MCU-03-P

Version	2.4
Date	6th December 2007
Purpose	MCU Nominal Science Contents Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	Unchanged.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified MCU HK parameters show expected increment

Procedure Steps: 07.41, 07/03/08.

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-MCU-03-P.tcl	MCUFRAMECNT	0/-/297	0/297	
Test Result (Pass/Fail):					

07:42

4.2.11 Procedure SPIRE-IST-COLD-FUNC-BSM-01-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Chop/Jiggle Sensor Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected ON values.

Procedure Steps:

07:43 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-BSM-01-P.tcl	—	—	— OK	
2	Check that the Chop and Jiggle sensors have switched on	CHOPSENSPWR JIGGSENSPWR	0/1/1 0/1/1	0/1/1 0/1/1	
Test Result (Pass/Fail):					

07:44

4.2.12 Procedure SPIRE-IST-COLD-FUNC-BSM-03-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Open Loop Dynamics Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	CHOPSENSSIG/JIGGSENSIG HK parameter evolve in the same direction as the commanded positions

Procedure Steps: 07:47 07/03/08.

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-BSM-03-P.tcl	—	—	— OK	
2	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	—	
Test Result (Pass/Fail):					

07:52.

4.2.13 Procedure SPIRE-IST-COLD-FUNC-BSM-05A-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Open Loop Chop Test
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	The BSM Chops between the commanded positions

Procedure Steps: 07:56 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05A-P.tcl	—	—	OK	
2	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	OK	
Test Result (Pass/Fail):					

07:57

4.2.14 Procedure SPIRE-IST-COLD-FUNC-BSM-05B-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Close Loop Chop Test
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Final configuration	BSM is in closed loop mode
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	The BSM Chops in between the commanded positions

Procedure Steps: 08:02 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-IST-COLD-BSM-INIT-P.tcl	CHOPLOOPMODE JIGGLOOPMODE	3/-/1 3/-/1	OK	
2	Execute TCL script SPIRE-IST-COLD-FUNC-BSM-05B-P.tcl	—	—	OK	
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	OK	
Test Result (Pass/Fail):					

PVS 1.

08:12

4.2.15 Procedure SPIRE-IST-COLD-FUNC-BSM-06-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Closed Loop Operational Mode Chop Test
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON. BSM is in closed loop.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • CHOP PARAMETERS and JIGGLE PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	The BSM Chops between the commanded positions

Procedure Steps: 08:15. 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
	FUNC				
1	Execute SPIRE-IST-COLD-BSM-06-P.tcl	CHOPLOOPMODE JIGGLOOPMODE	1/1/1 1/1/1	OK	SVH
2	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SVH
Test Result (Pass/Fail):					

08:16.

4.2.16 Procedure SPIRE-IST-COLD-BSM-OFF-P

Version	2.4
Date	6th December 2007
Purpose	BSM (PRIME) Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are OFF.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected OFF values.

Procedure Steps: 08:20 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-IST-COLD-BSM-OFF-P.tcl	—	—	OK	SM
2	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0	1/0 1/0	SM
Test Result (Pass/Fail):					

08:21.

4.2.17 Procedure SPIRE-IST-COLD-FUNC-SMEC-01-P

Version	2.4
Date	6th December 2007
Purpose	SMEC (PRIME) Encoder/LVDT Sensor Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.

Procedure Steps: 08:23 07/03/08.

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-SMEC-01-P.tcl	—	—	OK	
2	Check that power to the SMEC LED and LVDT sensor is on	SMECENCPWR SMECLVDTPWR	0/-/1 0/-/1	OK	
Test Result (Pass/Fail):					

08:24.

4.2.18 Procedure SPIRE-IST-COLD-FUNC-SMEC-03-P

Version	2.4
Date	6th December 2007
Purpose	SMEC (PRIME) Encoder Integrity Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	MCUENGSMECENCSIG1/2 increase as the encoder power is increased

Procedure Steps: 08:25 07/03/08

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

08:26

4.2.19 Procedure SPIRE-IST-COLD-SMEC-OFF-P

Version	2.4
Date	6th December 2007
Purpose	SMEC (PRIME) Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are OFF.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.

Procedure Steps: 08:27 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-IST-COLD-SMEC-OFF-P.tcl	—	—	OK.	
2	Check that the power to the SMEC sensors is switched off	SMECENCPWR SMECLVDTPWR	1/-/0 1/-/0	1/0 1/0	
Test Result (Pass/Fail):					

08:28

4.2.20 Procedure SPIRE-IST-COLD-FUNC-DCU-02-P

Version	2.4
Date	6th December 2007
Purpose	DCU Nominal Science Contents Check PRIME
Initial configuration	SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced and MCU is booted.
Final configuration	Unchanged
Preconditions	• **SPIRE-IST-COLD-DPU-ON-P** and **SPIRE-IST-COLD-DRCU-ON-P** procedures have been executed. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • I-EGSE is up and running • DCU PARAMETERS display is selected on the CCS • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	DCU HK parameters increment as expected

Procedure Steps:

08:34. 07/03/08

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-02-P.tcl	DCUFRAMECNT	n/n+700	1600/ 2300	
2	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	
Test Result (Pass/Fail):					

08:38.

4.2.21 Procedure SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P

Version	2.4
Date	6th December 2007
Purpose	Photometer BDAs switch ON check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	7 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 08:40 07/03/08.

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P.tcl	—	—	— OK	
2	Check that the Photometer detectors and LIAs are switched on	PSWJFETSTAT PMLWJFETSTAT PLIABITSTAT PLIAP5V PLIAP9V PLIAM9V	0/-/0x3F 0/-/0x7F 1 ~0/ ~+5.17 ± 0.1V ~0/ ~+11.53 ± 0.1V ~0/ ~-11.53 ± 0.1V	0/0x3F 0/0x7F 1 5.23V 11.58V -11.58V.	OK
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK.	
Test Result (Pass/Fail):					

08:42.

4.2.22 Procedure SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P

Version	2.4
Date	6th December 2007
Purpose	Photometer BDAs integrity check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	15 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 09:02 07/03/08.

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Photometer LIAs and detectors are switched on	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1 0x3F 0x7F	1 0x3F 0x7F	OK
2	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P.tcl	—	—	— OK	OK
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	
Test Result (Pass/Fail):					

09:18.

RAL Comment:
Required manual swing
Unexpected values (similar to those seen before swap).

4.2.23 Procedure SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P

Version	2.4
Date	6th December 2007
Purpose	Photometer BDAs noise level check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Photometer BDA signals show no excess noise

Procedure Steps: 09:38 07/03/08.

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Photometer LIAs and detectors are switched on	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1 0x3F 0x7F	1. 0x3F 0x7F	OK SWH
2	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P.tcl	—	—	— OK	SWH
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SWH
Test Result (Pass/Fail):					

09:47.

4.2.24 Procedure SPIRE-IST-COLD-PHOT-VSS-P

Version	1.0
Date	6th December 2007
Purpose	Photometer BDAs Vss Test PRIME
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	20 minutes
Pass/Fail criteria	Photometer BDA Vss values are optimised

Procedure Steps: 09:44 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Photometer LIAs and detectors are switched on	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1 0x3F 0x7F	1 0x3F 0x7F	SNH
2	Execute TCL script SPIRE-IST-COLD -PHOT-VSS-P.tcl	—	—	— OK	SNH
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SNH.
Test Result (Pass/Fail):					

SPR-347

10:01

4.2.25 Procedure SPIRE-IST-COLD-PDET-OFF-P

Version	2.4
Date	6th December 2007
Purpose	Photometer BDAs Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Photometer BDAs are OFF
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 10:22 07/03/08.

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-PDET-OFF-P.tcl	—	—	—	
2	Check that the Photometer detectors are switched off	PSWJFETSTAT PMLWJFETSTAT	0x3F/-/0 0x7F/-/0	0x3F / 0 0x7F / 0	SMA
3	Check that the Photometer LIAs are switched off	PLIABITSTAT	1/-/0	1 / 0	SMA
4	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SMA
Test Result (Pass/Fail):					

10:23.

4.2.26 Procedure SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P

Version	2.4
Date	6th December 2007
Purpose	Spectrometer BDAs switch ON check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	7 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 10:29 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P.tcl	—	—	— OK	SWH
2	Check that the Spectrometer detectors and LIAs are switched on	SPECJFETSTAT SLIABITSTAT SLIAP5V SLIAP9V SLIAM9V	0/-/7 1 ~0/ ~+5.23 ± 0.1 ~0/ ~+11.57 ± 0.1 ~0/ ~-11.54 ± 0.1	0/7 1 5.25V 11.59V -11.57V	SWH
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— NOK	Fail. SWH
Test Result (Pass/Fail):					

PVS2.*

10:32.

* PVS2. Step 1 OK. SWH

Step 2: T246 = 10.66K } @ 10:50 UTC.
T247 = 11.92K }

Step 3: NOK: JFETs still not switched on.

Step 4: OK: JFETs now switched ON.

Step 5: OK.

Step 6: OK.

Step 7: continue nominal procedure

4.2.27 Procedure SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P

Version	2.4
Date	6th December 2007
Purpose	Spectrometer BDAs integrity check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	12 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 11:52 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the Spectrometer detectors and LIAs are switched on	SPECJFETSTAT SLIABITSTAT	7 1	7 1	SMM
2	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P.tcl	—	—	— OK	SMM
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SMM
Test Result (Pass/Fail):					

12:05.

R. Goossens

4.2.28 Procedure SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P

Version	2.4
Date	6th December 2007
Purpose	Spectrometer BDAs noise check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Spectrometer BDA signals show no excess noise

Procedure Steps: 12:09 07/03/08.

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the Spectrometer detectors and LIAs are switched on	SPECJFETSTAT SLIABITSTAT	7 1	7 1	SNH
2	Execute TCL script SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P.tcl	—	—	— OK	SNH
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SNH
Test Result (Pass/Fail):					

12:12

R. Goossens

4.2.29 Procedure SPIRE-IST-COLD- SPEC-VSS-P

Version	2.4
Date	6th December 2007
Purpose	Spectrometer BDAs Vss Test PRIME
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON.
Final configuration	Unchanged
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	20 minutes
Pass/Fail criteria	Spectrometer BDA Vss values are optimised

Procedure Steps: 12:13 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that the Spectrometer detectors and LIAs are switched on	SPECJFETSTAT SLIABITSTAT	7 1	7 1	SNH
2	Execute TCL script SPIRE-IST-COLD- SPEC-VSS-P.tcl	—	—	— ok	SNH
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— ok.	SNH
Test Result (Pass/Fail):					

12:28.

G. R. Goossens

4.2.30 Procedure SPIRE-IST-COLD-SDET-OFF-P

Version	2.4
Date	6th December 2007
Purpose	Spectrometer BDAs Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted and Spectrometer BDAs are OFF
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	DCU HK parameters show expected values

Procedure Steps: 13:04 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-SDET-OFF-P.tcl	—	—	OK	SNH
2	Check that the Spectrometer detectors are switched off	SPECJFETSTAT	7/-/0	7/.0	SNH
3	Check that the Spectrometer LIAs are switched off	SLIABITSTAT	1/-/0	1/	SNH
4	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	— OK	SNH
Test Result (Pass/Fail):					

13:06.

R. Gosseens

* PVS 3. 1) OK
13:23 2a) - OK JFETS switched ON.
13:27 2b) - OK
13:41 2c) - OK
13:43 END

4.2.31 Procedure SPIRE-IST-COLD-MCU-OFF-P

Version	2.4
Date	6th December 2007
Purpose	MCU PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is OFF.
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is ON. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified MCU HK Parameter shows expected value.

Procedure Steps: 13:44 07/03/08

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-IST-COLD-MCU-OFF-P.tcl	—	—	OK	SNH
2	Check that the MCU is switched off	MCUBITSTAT	1/-/0	1/0	SNH
Test Result (Pass/Fail):					

13:44

R. Cousins

4.2.32 Procedure SPIRE-IST-COLD-SCU-OFF-P

Version	2.4
Date	6th December 2007
Purpose	SCU PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is OFF
Preconditions	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified SCU HK Parameters show expected value.

Procedure Steps: 13:45 07/03/08

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-SCU-OFF-P.tcl	—	—	OK	SNH
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0xFFFF/-/0	0xFFFF/ 0	SNH
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0	1 / 0	SNH
Test Result (Pass/Fail):					

13:46

R. Goossens

APPENDIX 6

Parts that are relevant for this Activity Control Sheet:

Ref3 **HP-2-ASED-PR-0070 Iss 1**

APPENDIX 6 TO ACS:
SD-0270

Title: **Herschel PCDU & CDMS nominal switch on / off procedure**

CI-No: N/A

Prepared by:	Maukisch	Date: 19/09/07
Checked by:	Kölle Hohn	20/09/07
Product Assurance:	Stritter	24.09.07
Configuration Control:	Wietbrock	24.09.07
Project Management:	Dr. Fricke	25/09/2007

Distribution: See Distribution List (last page)

Table of Content

1 Scope

1.1 Objective

This Procedure represents the nominal Herschel PCDU & CDMS switch on / off procedure to support electrical integrations and electrical tests.

1.2 Operational Flow

In paragraph 7 is provided the detailed step-by-step test procedure.

BSW	Basic Software
CBH	Cathalyst Bed Heater
CCS	Central Check-out System
CCSDS	Consultative Committee for Space Data Systems
CDMU	Control and Data Management Unit
CDMS	Control and Data Management Sub-system
CIR	CDMU In Reconfiguration
CLCW	Command Link Control Word
CLTU	Command Link Transmission Unit
CPDU	Command Pulse Distribution Unit
CRS	Coarse Rate Sensor
CTR	Central on board Reference Time
EEPROM	Electrically Erasable PROM
EGSE	Electrical Ground Support Equipment
FCL	Fold-back Current Limiter
FCV	Flow Control Valves
FDIR	Failure Detection, Isolation, and Recovery
GDIR	General Design and Interface Requirement
GRP	Group Heaters Switch
HBR	High Bit Rate
HL/HLC	High Level command
HP/HPC	High Priority commands
HPSDB	Herschel Planck System Data Base
HW	Hardware
I/F	InterFace
I/O	Input/Output
ICD	Interface Control Document
IST	Integrated System Test
LV	Latching Valves
LBR	Low Bit Rate
MAP	Multiplexed Access Point
MBR	Medium Bit Rate

TAI	International Atomic Time
TC	TeleCommand
TFG	Transfer Frame Generator
TM	TeleMetry
TTC	Telemetry Tracking & Command subsystem
TTR	Telemetry Telecommand and Reconfiguration
UFT	Unit Functional Test
VC	Virtual Channel
WD	Watchdog

4 Configuration

4.1 Herschel S/C Configuration

4.1.1 Hardware Configuration

The activities described in this test procedure require the complete SVM configuration.

4.1.2 Software Configuration

The PCDU & CDMS Switch On / Off will be run with the following on-board software configuration:

- CDMS OBSW: the actual SW version shall be used

4.1.3 Test Configuration

N/A

4.1.4 Simulated Equipments

N/A

4.2 Set-up

N/A

5.4 GSE

5.4.1 MGSE

N/A

5.4.2 CVSE

N/A

5.4.3 EGSE

5.4.3.1 EGSE Hardware Configuration

S/S	Unit	Configuration			SCOE simulated eqpts	Remarks
		Herschel				
EGSE	CCS	1				
	TM/TC DFE	1				
	POWER SCOE	1				

5.4.3.2 EGSE User Software

- CCS the actual SW version shall be used
- TMTC DFE the actual SW version shall be used
- BS SOE the actual SW version shall be used
- LPS/SAS SCOE the actual SW version shall be used
- HPSDB the actual SW version shall be used

5.4.3.3 Grounding Configuration

N/A

6 Verification Requirements and Test Criteria

N/A

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
50	Open the "Session Manager System Window" HPCSS • click (1x) on the desktop icon "Start MMi" • verify if a.m. window appears	Pass		O K		✓	
60	Open the "Session Manager Execution Window" REALTIME for starting a Test Session • from "Session Manager System Window" HPCSS Execution → Start • verify if a.m. window appears.	Pass		OK		✓	
70	Prepare start of a Test Session in the "REALTIME Window" • select in field "Test Environment Name" the default Test Environment "HEAD" or • another Test Environment name if required for the specific Integration or Test	Pass		OK		✓	
80	Start the Test Session in the "REALTIME Window" • Click on "Start" button • Update logbook with Test Session and Environment name • Wait for ca. 4 minutes • verify Status in "Session Manager System Window" HPCSS changes from INIT to RUN	Pass		OK		✓	
90	Verify Session Status in the "REALTIME Window" • RUN and NOT	Pass		OK		✓	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
130	Configure the HCI From the "Session Manager Execution Window" REALTIME • open "Telemetry Packet History Display" with Desktop -> Monitoring -> Packet History -> LIVE, resize window (smaller) and put at top of screen • open "Telemetry Packet History Display" with Desktop -> Monitoring -> Packet History -> STOP, Set Filter APID=16 -> LIVE, resize window (smaller) and put at middle of screen • open "Onboard Event Display Window" with Desktop -> Monitoring -> Onboard Event History -> LIVE, resize window (smaller) and put at bottom of screen	Pass		OK			
	At leftmost double screen workstation (left screen)						
140	Perform Join to a running Test Session (1) • Open the "Session Manager System Window" HPCSS by click (1x) on the desktop icon "Start Mmi" • verify if a.m. window appears	Pass		ok			
150	Join a running Test Session (2) • from "Session Manager System Window" HPCSS with Execution -> Join • minimize HPCSS window to avoid unintended stop of session	Pass		OK			

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
180	Configure the HCI From the "Session Manager Execution Window" REALTIME • open "Telemetry Window" with Desktop -> Monitoring -> Monitoring Desktop -> AND (Alpha Numeric) and select all essential low / high HK • select TM/TC DFE HK parameters 1-3: YAHK 1946, 2946, 3946 -> Apply • select BS SCOE HK parameters: YAHK1956 -> Apply • select LPS SCOE HK parameters 1-2, 2-2: YAHK1952, 2952 -> OK • click on List • Resize 4 large	Pass		OK			

7.2 TM/TC DFE nominal switch on

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	At the TM/TC DFE rack						
10.	Switch on the "Insulation Transformer" (at bottom left, if not already ON) Note: Sometimes it is necessary to switch on also the bottom mid breaker	Pass					
	At the TM/TC DFE PC						
20.	Switch on the "User Workstation" (black button) Verify the boot is successfully completed	Pass					
	At the TM/TC DFE rack						
30.	Switch on the External Interface Unit „EIU".	Pass					
40.	During system power-up verify the LED's on the EIU Front Panel come on and He TM/TC EIU ... at screen	LED's On					
50.	Switch on the TM/TC "Baseband Processor" and wait for it to boot. (Kippschalter)	Pass					
60.	During system power-up verify that multiple LED's on the TM/TC "Baseband Processor Front Panel" will light. Wait until number of lighting LED`s is reduced.	LED's On					

7.3 BS SCOE nominal switch on => in Cleanroom

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	At the BS SCOE rack (right)						
10.	Switch on the SCOE rack power (key, down left)	OK					
	At the BS SCOE PC (left)						
20.	Switch on the SCOE controller and wait until the boot of the operating system is finished	OK					
30.	Log in as SCOE user. Username: hpp Password: HPP_us -> GO	OK					
40.	Start the SCOE application by clicking on the SCOE icon (H-P BS) (1x)	OK					
50.	On the popped up H-P BS SCOE window "Startup parameters" select the value for • Payload Model: HERSCHEL • Startup method: NORMAL -> OK	Pass					
60.	Verify in the H-P BS SCOE window the SCOE State is "LOCAL"	OK					
70.	Verify in the H-P BS SCOE window the S/C interface is "OFFLINE" Wait for 100 % Selftest: PASSED	OK					

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
70.	Verify at the ELGAR Master PC Monitor (rack 2) if LPS/SAS SCOE is started. Application is correct when screen shows all values in a matrix.	OK					
80.	Start the LPS/SAS SCOE Application SW by clicking on the "H-P LPS" icon (1x)	OK					
90.	Into the "Startup Parameter" window select • Payload model: Herschel • Startup method: NORMAL -> OK.	OK					
100.	Into the "Operator Comment" window confirm the installed harness is the same of the S/C model selected, type in "yes" -> OK	OK					
110.	Verify the SelfTest, connections, etc. is started and wait until it is 100% finished. (ca. 10 min)	OK					
120.	Verify into the "H-P LPS SAS SCOE" main window the following fields: • Selftest State: Passed (green coloured). • SCOE State: LOCAL • SCOE activity: IDLE • S/C interface: ISOLATED	OK					

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
20.	Verify if yellow light is ON in the clean-room (during …UNIT_CHECK script) **Note**: In case of a previous emergency switch OFF or S/C power OFF perform: • Immediate after the yellow light on top of the SAS SCOE is switched on • =>Click 4x (ARM and GO) from SCOS 2000 Manual Stack Window	OK		N/A		N/A	
30.	**D102159SCVT007PM_RESET** Click the button "End TS!" to proceed	OK		OK	Error: due to TR2 currently under repair	SM	
40.	**Z010999MCVT001_POWER_ON** Click the button "End TS!" to proceed	OK		OK		SM	
50.	**D102159SCVT032TIMESYNCRO** Wait until the synchronization between CDMS On-board Time and CCS is finished and Click the button "End TS!" to proceed	OK		OK		SM	

7.8 LBS/SAS SCOE nominal switch off => in Clean-room

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	At the LBS/SAS SCOE PC (right)						
10.	Verify into the "H-P LPS SAS SCOE" main window the following fields: • SCOE State: LOCAL • SCOE activity: IDLE • S/C interface: ISOLATED	OK					
20.	Into the "H-P LPS SAS SCOE" main window select the menu option File → RackShutdownExit	OK					
30.	Into the "Logout confirmation" window select "Go OFFLINE/Isolate S/C" and click "Logout". Press Shutdown. (Note: This takes a while to complete, ca. 5 min)	OK					
40.	Verify the application is stopped.	OK					
	At the LBS/SAS SCOE rack						
50.	After the monitor in the rack is switched off, switch off both the ELGAR controller PCs.	OK					
60.	Shutdown and switch off the PC workstation.	OK					

7.10 TM/TC DFE nominal switch off

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	At the TM/TC DFE PC						
10.	From the "System Status Window" → System Page → System State Box → Control Mode Verify that this label is set to 'Local'. If not, command it (password: H-P).	Local					
20.	From the System Status Window → System Page → System State Box → Operation Mode Verify that this label is set to 'Offline'. If not, command it.	Offline					
30.	Stop the CMS application, from the menu File → Exit.	Pass					
40.	The Exit System window appears.	Pass					
50.	Select Platform Shutdown, CMS Shutdown and click OK.	Pass					
60.	Shutdown the Workstation.	Pass					

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
30.	From the "Session Manager Execution Window" REALTIME, select the menu button Execution → Close. Verify the window disappears.	Pass					
40.	From the "Session Manager System Window" HPCSS, select the menu button System → Quit... Verify the window disappears.	Pass					
50.	Close all remaining HCI windows	Pass					
60.	Execute the System Logout from the KDE Start menu. Verify the Red Hat login window appears.	Pass					
70.	If not used anymore, switch off any other workstation (also in Cleanroom).	Pass					
80.	Switch off all workstation screens	Pass					
90.	Make an entry into the Logbook, that the S/C is powered off	Pass					
100.	Make a Printout of Script/Command History executed during the day and put it into the Logbook	Pass					

	Name	Dep./Comp.
	Alberti von Mathias Dr.	ASG23
	Baldock Richard	FAE12
	Barlage Bernhard	AED13
	Bayer Thomas	ASA42
	Brune Holger	ASA45
	Edelhoff Dirk	AED2
	Fehringer Alexander	ASG13
X	Fricke Wolfgang Dr.	AED 65
	Geiger Hermann	ASA42
	Grasl Andreas	OTN/ASA44
	Grasshoff Brigitte	AET12
X	Hamer Simon	Terma
	Hendrikse Jeffrey	HE Space
	Hendry David	Terma
	Hengstler Reinhold	ASA42
	Hinger Jürgen	ASG23
X	Hohn Rüdiger	AED65
	Hölzle Edgar Dr.	AED32
X	Hopfgarten Michael	AED32
	Huber Johann	ASA42
	Hund Walter	ASE252
X	Idler Siegmund	AED312
	Ivády von András	FAE12
	Jahn Gerd Dr.	ASG23
	Kalde Clemens	ASM2
	Kettner Bernhard	AET42
	Knoblauch August	AET32
X	Koelle Markus	ASA43
X	Koppe Axel	AED312
X	Kroeker Jürgen	AED65
X	La Gioia Valentina	Terma
	Lang Jürgen	ASE252
	Langenstein Rolf	AED15
	Langfermann Michael	ASA41
	Martin Olivier	ASA43
X	Maukisch Jan	ASA43
X	Much Christoph	ASA43
	Müller Jörg	ASA42
X	Müller Martin	ASA43
	Peltz Heinz-Willi	ASG13
	Pietroboni Karin	AED65
	Platzer Wilhelm	AED2
	Reichle Konrad	ASA42
	Runge Axel	OTN/ASA44
	Sauer Maximilian Dr.	AED65
X	Schink Dietmar	AED32
	Schmidt Thomas	AED15

	Name	Dep./Comp.
	Schweickert Gunn	ASG23
X	Sonn Nico	ASG51
	Steininger Eric	AED32
X	Stritter Rene	AED11
	Suess Rudi	OTN/ASA44
X	Theunissen Martijn	DSSA
X	Vascotto Riccardo	HE Space
	Wagner Klaus	ASG23
	Wietbrock Walter	AET12
	Wöhler Hans	ASG23
	Wössner Ulrich	ASE252
	Zumstein Armin	ASQ42
X	ESA/ESTEC	ESA
X	Thales Alenia Space Cannes	TAS-F
X	Thales Alenia Space Torino	TAS-I
	Instruments:	
	MPE (PACS)	MPE
	RAL (SPIRE)	RAL
	SRON (HIFI)	SRON
	Subcontractors:	
	Austrian Aerospace	AAE
	Austrian Aerospace	AAEM
	BOC Edwards	BOCE
	Dutch Space Solar Arrays	DSSA
	EADS Astrium Sub-Subsyst. & Equipment	ASSE
	EADS CASA Espacio	CASA
	EADS CASA Espacio	ECAS
	European Test Services	ETS
	Patria New Technologies Oy	PANT
	SENER Ingenieria SA	SEN
	Thales Alenia Space, Antwerp	TAS-ETCA

6 Appendix 2: SPIRE LPU Check As-Run Procedure

(ref. HP-2-ASED-SD-0281)

Location : ESA	Title: SPIRE LPU Check		
Facility : Class 100 000	Model: PFM	Subsystem: SPIRE	Date: 06.03.2008
CI No.: 125 200	Test Conductor: A. Koppe	RAL: D. Griffin / S. Sidher	NCR Ref:
	Prepared By: A. Koppe		CIL No:

Scope: This SPIRE procedure shall be executed to check the current drawn when the LLPU is enabled or disabled		**Procedures and reference documents:-** Ref.1: SPIRE FM Short Functional Test Procedures: SPIRE-RAL-PRC-2398, iss. 2.4
Facilities required:	EGSE: CCS, I-EGSE	**Drawings:** none
Personnel required:	1 CCS Operator ; 1 Instrument Representative; 1 Test Conductor; 1 QA	**MASS:**
Safety and Hazards:	Cryostat harness connected to CCU.	
Constraints:	Class 100 000 clean room EPLM mounted on SVM	SPIRE MIB loaded in HPSDB is version 2.2.H1 PR Spire MIB loaded on IEGSE :2.2.G7
EGSE CCS SW version:		**On-Board S/W:** CDMS ASW: Version 3.1.3 SPIRE OBS version: Version DPU 2.2.H Partition 1 ; main and redundant Version DPU 2.2.G partition 2 ; main and redundant
HPSDB:		HPSDB: HP-ASP-LI-1441_8 draft release Note

Release AIT: 7.03.08	Release SE: 7/3	Release PA/Safety:	Sign off (PA/QC/Team Leader)
Release Floor Manager: 7.03.08	Release SPIRE Instrument / RAL:		07/03/08

APPENDIX 1

Activity Control Sheet: Session Record

Session ID	Start Date/Time	End Date/Time	QA Approval
Docks_U3_U7_U5_33-NF cdmu_hpw22-REACTIVE-SP.RECFT.	07/03/08 14:18	07/03/08 14:33	R. Goossens
ENV: HP_2_ASED_SD_0280-RECIN_0001			

No:	Activity	Expected Value Before/During/After	Actual Value	Success/Failure	Responsible & sign off
01	Verify that the SCOE cable connection according to Annex 2 is in place and inform Floor Manager that ACS will start		OK		
02	**START OF SPIRE LPU CHECK**				
03	Configure EGSEs and switch ON SVM Switch ON SPIRE Launch Lock EGSE	Green light expected	OK		
04	Send command **DC904180;** on VPD check that packet 120 is disabled TM(14, 4)	Packet 120 disabled	OK		
05	Send command **ZCB00999** to load new diagnostic packet (default parameters)		OK		
06	Send command **DC900180** with parameters: **Repeater=1; DH019180=26; DH020180=120**		OK		
07	Send command **DC904180**; On VPD check packet 120 is enabled	Packet 120 enabled	OK		
08	Check for **SPID=264000999** receipt on CCS		OK		

No:	Activity	Expected Value Before/During/After	Actual Value	Success/Failure	Responsible & sign off
	Perform SPIRE Prime LPU check according to sections 4.1.24 and 4.2.24 of Ref1:	Initial status after enabling packet LCL 25 WM12B565= OFF WM107565 = 0.506A. LCL 26 WMA2B565= OFF WMA07565 = 0.881A			
09	**Power on Prime LPU LCL (LCL#25)** Execute: **DC25D170**	**Status WM12B565 OFF/ON**		State of LCL #25 switches to ON	
10	Send HL command #5 (LPU Enable Prime) Execute: **ZCI02999**	Monitor TM packet: **Wm107565:** 0 mA / / 130 -180 mA		Current between 130 -180 mA	
11	Send HL command #6 (LPU Disable Prime) Execute: **ZCI42999**	Monitor TM packet: **ZAW000999:** 130 -180 mA/ / 0 mA	NOT PERFORMED	Current OFF	NCR - to be Raised
12	**Un-Power LPU LCL (LCL#25)** Execute: **DC25B170**	**Status WM12B565: ON/OFF**		State of LCL #25 switches to OFF	
13	**Power on Prime LPU LCL (LCL#26)** **Dc26d170**	**Status WMA2B565: OFF/ON**		State of LCL #26 switches to ON	
14	Send HL command #21 (LPU Enable Prime) Execute: **ZCA02999**	Monitor TM packet: **WMA07565:** 0 mA / / 130 -180 mA		Current between 130 -180 mA	
15	Send HL command #22 (LPU Disable Prime) Execute: **ZCA42999**	Monitor TM packet: **ZAW000999:** 130 -180 mA/ / 0 mA		Current OFF	

No:	Activity	Expected Value Before/During/After	Actual Value	Success/Failure	Responsible & sign off
16	**Un-Power LPU LCL (LCL#26)** Execute: **DC26B170**	**Status WMA2B565: ON/OFF**	NOT PERFORMED	State of LCL #26 switches to OFF	
17	Send command **DC902180** with parameters: **Repeater=1; DH019180=26; DH020180=120**		OK	✓	
18	Send command **DC904180**; On VPD check that packet120 is disabled		OK	✓	
19	Switch OFF SPIRE Launch Lock EGSE		OK	✓	
END	Inform Floor Manager ACS complete		ok	✓	

APPENDIX 1

Actual **SCOE cable connection (to be confirmed by AIT)**

SCOE CABLES CONNECTION to HERSCHEL S/C					
SKIN-01	PWR Panel (PCDU)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	BS Nom Power	SK01BJ09	PCDU	BS SCOE Cable Plugged	
	BS Red Power	SK01BJ10	PCDU	BS SCOE Cable Plugged	
	BDR1 AIT	SK01BJ11	PCDU	LPS SCOE Cable Plugged	
	BDR2 AIT	SK01BJ12	PCDU	LPS SCOE Cable Plugged	
	SA Nom Power	SK01AJ01	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ02	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ03	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ04	Battery	EMC Dust Cap	~~EMC Dust Cap~~
	SA Red Power	SK01AJ05	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ06	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ07	PCDU	POWER SCOE Cable Plugged	
SKIN-02	PWR Panel (ACC, CDMU, RCS, 1553 & Thruster)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-02	DMS 1553 Bus_A	J01	CDMU	Bus Monitor Cable Plugged	
SKIN-02	DMS 1553 Bus_B	J02	CDMU	Bus Monitor Cable Plugged	
SKIN-02	ACMS 1553 Bus_A	J03	ACC	ACMS SCOE Cable Plugged	
SKIN-02	ACMS 1553 Bus_B	J04	ACC	ACMS SCOE Cable Plugged	
SKIN-02	LV1/FCV 20N CMD S/A M	J05	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	LV2/FCV 20N CMD S/A R	J06	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	RCS Press/Tank Temp/PT Pwr	J07	ACC/PT&TH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster Temp M/LV1 Sts	J08	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	CDMU and ACC EEPROM reprogramming input	J09	ACC/CDMU		Flight Plug SK02P09 Plugged
SKIN-02	CDMU and ACC EEPROM reprogramming input	J10	ACC/CDMU		Flight Plug SK02P10 Plugged
SKIN-02	Thruster Temp R/LV2 Sts	J11	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters M	J12	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters R	J13	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Str1/2 On/Off Cmd M/Str1 Sts	J14	ACC/STR-1		ACMS Flight Plug SK02P14 Plugged

SKIN-02	Str1/2 On/Off Cmd R/Str2 Sts	J15	ACC/STR-2		ACMS Flight Plug SK02P15 Plugged
SKIN-02	Gyro A On/Off Cmd	J16	ACC/GYRO-E1		ACMS Flight Plug SK02P16 Plugged
SKIN-02	Gyro B On/Off Cmd	J17	ACC/GYRO-E2		ACMS Flight Plug SK02P17 Plugged
SKIN-03	TTC Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-03	Test point TC + protection jumper EPC1	SK03J01	XPND1/EPC1		Plastic cap
SKIN-03	Test point TC + protection jumper EPC2	SK03J02	XPND2/EPC2		Plastic cap
	RF LINK				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	RF link for antenna LGA1	N/A	LGA1	RF SCOE LGA1 Plugged	LGA1 Anechoic Cap
	RF link for antenna LGA2	N/A	LGA2	RF SCOE LGA2 Plugged	LGA2 Anechoic Cap
	RF link for antenna MGA	N/A	MGA	RF SCOE MGA Plugged	MGA Anechoic Cap
SKIN-04	ACMS Panel (RWE)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-04	RWL1 Sgn	J01	ACC/RWL-1		ACMS Flight Plug SK04P01 Plugged
SKIN-04	RWL2 Sgn	J02	ACC/RWL-2		ACMS Flight Plug SK04P02 Plugged
SKIN-04	RWL3 Sgn	J03	ACC/RWL-3		ACMS Flight Plug SK04P03 Plugged
SKIN-04	RWL4 Sgn	J04	ACC/RWL-4		ACMS Flight Plug SK04P04 Plugged
SKIN-05	GYR/QRS Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-05	CRS1 AOCS Sgn	J01	CRS-1/ACC		ACMS Flight Plug
SKIN-05	CRS2 AOCS Sgn	J02	CRS-2/ACC		ACMS Flight Plug
SKIN-05	GYRO RS422 / Test	J03	GYRO	ACMS SCOE Cable Plugged	
SKIN-05	CRS 1/2 Stimuli	J04	CRS-1,2	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn M	J05	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn M	J06	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn R	J07	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn R	J08	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-06	STR Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-06	STR1 Stimuli	J01	STR1	ACMS SCOE Cable Plugged	
SKIN-06	STR2 Stimuli	J02	STR2	ACMS SCOE Cable Plugged	
	UMBILICAL				
	Connector Function	Connector	S/C unit	SCOE CABLE	
	Power/Data	HU1J01	SYSTEM	SCOEs cable Plugged	
	Power/Data	HU2J01	SYSTEM	SCOEs cable Plugged	

APPENDIX 2

S/C Operational Status Sheet

S/C Lead Sign: HERSCHEL SAT AIT constrains sheet 06.03.08 15:42
Tel: ESTEC-54125

	Op	Comments	Non Op
CDMS			
CDMU	X		
1553 MIL-BUS A	X		
1553 MIL-BUS B	X		
PCS			
PCDU	X		
BAT		**BS SCOE connected**	X
Solar Array		**Not installed**	X
TCS	X		
TT&C	**X**		
MGA	X		
LGA1	X		
LGA2	X		
ACMS	**X**		
1553 MIL-BUS A	X		
1553 MIL-BUS B	X		
ACC	X		
RWL1,2,3,4	X		
SAS1	X		
SAS2	X		
AAD	X		
GYR	X		
STR1	X		
STR2	X		
CRS1	X		
CRS2	X		
RCS		**Simulated**	**X**
CCU	**X**	**CryoSCOE connected (except Temperature senor 315100-J06 for Telescope)**	
SPIRE	**X**		**X**
WUs			
FPU			
PACS	**X**		
WUs			
FPU			
HIFI	**X**		
WUs			
FPU			
VMC	**X**		
SREM	**X**		
CryoCover		**Not connected**	**X**

7 Appendix 3: Instrument Test Reports

1. INTRODUCTION

This document reports on the first COLD functional tests performed on the SPIRE MAIN instrument during the IST test campaign.

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 (specified in this document) is met.

1.2 REFERENCE DOCUMENTS

Ref	Document	Name	Version/Issue No.
RD01	SPIRE-RAL-DOC-001652	SPIRE Functional Tests Specification	Issue 1.4
RD02	SPIRE-RAL-DOC-001630	SPIRE I-EGSE Set-up Procedure	Issue 2.2
RD03	SPIRE-RAL-PRJ-001078	SPIRE Data ICD	Issue 2.1
RD04	Sap-SPIRE-CCa-076-02	DRCU/DPU Interface Control Document	Issue 1.3
RD05	LAM.PJT.SPI.NOT.011011	MCU/DPU Command List ICD	Issue 5.0
RD06	SPIRE-IFS-PRJ-001391	SPIRE OBS User Manual	Issue 2.2.H
RD07	SPIRE-RAL-PRC-002398	SPIRE FM Cold Functional Test Procedures	Issue 2.4
RD08	SPIRE-RAL-REP-003087	IST WARM FUNCTIONAL TEST REPORT III – Prime Side (After Harness Repair)	Issue 1.0
RD09	HP-2-ASED-SD-0203	SPIRE WFT after repair of pixel anomalies on SVM-SIH connectors based on HP-112000-ASED-NC-3725	Issue 01

1.3 CHANGE RECORD

Document	Change date	Changes
Issue 1.0	07/03/2008	First Version

TABLE OF CONTENTS

2. FUNCTIONAL TEST CONFIGURATION

2.1 Software Configuration

Write down in the table the current EGSE software configuration for the tests:

EGSE component	Version/Build number	Comment
SCOS2000	2.3eP5	
HCSS	v0.6.1 Build (#1430)	
QLA	v3.3	
QLA scripts	Latest versions from CVS	
CCS scripts	CVS version 1.1, Tag SPIRE_COLDFT_PRIME_PROC_V1	
CUS Scripts	Mission config fm_ist_cft_config2 in DB spire_fm_ist_db1 on spireqla	

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
hspireegse	EGSE router	Started	✓
hspireegse	EGSE Gateway	Started	✓
hspireegse	Pipe Gateway	Started	✓
hspireqla	Telemetry Ingestion	Started	✓
hspireqla	Packet Display	Started	✓
spires2k	SCOS2000	Started	✓
hspireqla	CCS Handler (Server)	Started	✓

3. TEST PROCEDURE

The following two sections describe general pass/fail criteria (Section 3.1), the general test layout (Section 3.2) and the detailed procedure for each functional test (Section 3.3).

3.1 GENERAL PASS/FAIL CRITERIA

The general criteria 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 analysed.

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 CFT sequence as it should be performed. In each step of this procedure the operator should refer to the detailed procedure in Section 3.3 .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 #	Procedure Name	Test Purpose	Duration /min
1	SPIRE-IST-COLD-DPU-ON-P	DPU PRIME Power up and OBS start	5
2	SPIRE-IST-COLD-DRCU-ON-P	DRCU PRIME Power up	4
3	SPIRE-IST-COLD-FUNC-SCU-02-P	SCU Nominal Science Contents check PRIME	5
4	SPIRE-IST-COLD-FUNC-SCU-03-P	SCU DC Thermometry check PRIME	8
5	SPIRE-IST-COLD-FUNC-SCU-06-P	SCU AC Thermometry check PRIME	2
6	SPIRE-IST-COLD-FUNC-SCU-07-P	Sorption Cooler Heaters Check PRIME	5
7	SPIRE-IST-COLD-FUNC-PCAL-01-P	PCAL Characterisation Test PRIME	5
8	SPIRE-IST-COLD-FUNC-SCAL-01-P	SCAL Characterisation Test PRIME	18
9	SPIRE-IST-COLD-FUNC-MCU-01-P	MCU Boot Check PRIME	5
10	SPIRE-IST-COLD-FUNC-MCU-03-P	MCU Nom. Science Contents Check PRIME	5
11	SPIRE-IST-COLD-FUNC-BSM-01-P	BSM Chop/Jiggle Sensors check PRIME	5
12	SPIRE-IST-COLD-FUNC-BSM-03-P	BSM Open Loop Dynamics Check PRIME	5
13	SPIRE-IST-COLD-FUNC-BSM-05A-P	BSM Open Loop Chop Test PRIME	5
14	SPIRE-IST-COLD-FUNC-BSM-05B-P	BSM Close Loop Chop Test PRIME	5
15	SPIRE-IST-COLD-FUNC-BSM-06-P	BSM Close Loop Operational Mode Chop Test PRIME	5
16	SPIRE-IST-COLD-BSM-0FF-P	BSM switch OFF PRIME	5
17	SPIRE-IST-COLD-FUNC-SMEC-01-P	SMEC Encoder and LVDT check PRIME	5

Step #	Procedure Name	Test Purpose	Duration /min
18	SPIRE-IST-COLD-FUNC-SMEC-03-P	SMEC Encoder Levels Check PRIME	5
19	SPIRE-IST-COLD-SMEC-OFF-P	SMEC switch OFF PRIME	5
20	SPIRE-IST-COLD-FUNC-DCU-02-P	DCU Nominal Science Contents Check PRIME	5
21	SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P	Photometer BDAs Switch ON Check PRIME	7
22	SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P	Photometer BDAs Integrity Check PRIME	15
23	SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P	Photometer BDAs Noise Check PRIME	5
24	SPIRE-IST-COLD-PHOT-VSS-P	Photometer BDAs Vss Test PRIME	20
25	SPIRE-IST-COLD-PDET-OFF-P	Photometer BDAs Switch OFF PRIME	3
26	SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P	Spectrometer BDAs Switch ON Check PRIME	7
27	SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P	Spectrometer BDAs Integrity Check PRIME	12
28	SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P	Spectrometer BDAs Noise Check PRIME	5
29	SPIRE-IST-COLD-SPEC-VSS-P	Spectrometer BDAs Vss Test PRIME	20
30	SPIRE-IST-COLD-SDET-OFF-P	Spectrometer BDAs switch OFF	3
31	SPIRE-IST-COLD-MCU-OFF-P	MCU switch OFF PRIME	2
32	SPIRE-IST-COLD-SCU-OFF-P	SCU switch OFF PRIME	2
33	SPIRE-IST-COLD-DRCU-OFF-P	DRCU power OFF PRIME	5
34	SPIRE-IST-COLD-DPU-OFF-P	DPU power OFF PRIME	5
35	**Next go back to RD8 for the Redundant tests.**		**15**
Total Duration ~ 4 Hours (just for PRIME)			

Table 1. General CFT sequence

***Note 1:** This procedure is not a functional test, is a close loop initialisation procedure required to test the close loop operability of the BSM.

***Note 2:** This procedure is not a functional test, is a close loop initialisation procedure required to test the close loop operability of the SMEC.

3.3 DETAILED TEST PROCEDURE

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

3.3.1 SPIRE-IST-COLD-DPU-ON-P

Version	2.4
Date	6th December 2007
Purpose	To switch on the SPIRE DPU PRIME and start generating housekeeping
Initial configuration	SPIRE DPU and DRCU PRIME are switched off
Final configuration	SPIRE DPU PRIME is ON and SPIRE HK is being produced , SPIRE DRCU

	PRIME is OFF
Preconditions	• SPIRE FM DPU is electrically integrated with the Herschel Satellite • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively.

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Select DPU AND OBS PARAMETERS display is on the CCS	—	—	—	**Pass**
2	**Power ON the SPIRE DPU PRIME unit using the dedicated spacecraft LCL line and configure 1553 Spacecraft bus for SPIRE DPU PRIME (RT = 21)**	—	—	—	**Pass**
3	Wait for the boot software to produce at least 2 event packets (5,1)	—	—	—	**Pass**
4	Execute TCL script SPIRE-IST-COLD-DPU-START-P.tcl	—	—	—	**Pass**
5	Check that Nominal and Critical HK packets are arriving at the CCS: **SPIRE Nominal HK:** • (type ,subtype) : (3,25) • APID : 0x502 **SPIRE Critical HK:** • (type ,subtype) : (3,25) • APID: 0x500	—	—	—	**Pass**
6	Check that THSK parameter is refreshing every second	THSK	Refreshing @ 1 Hz	—	**Pass**
7	Check that TM2N parameter is incrementing by 1 every second	TM2N	Incrementing by 1 @ 1Hz	—	**Pass**
8	Check that TM1N parameter is incrementing by 1 every 2 second	TM1N	Incrementing by 1 @ 0.5Hz	—	**Pass**
9	**On CCS check the consistency of the SPIRE on board time to the HCDMU time and the CCS. ***	—	—	—	**Pass**
10	On I-EGSE check the consistency between SCOS time and THSK and QLA time.	THSK	Incrementing once per second	—	**Pass**
Test Result (Pass/Fail):					

** Assuming that OBT is provided by the HCDMU following RD02, i.e, OBT is TAI, there should be a 33 second difference between OBS and CCS time (assuming CCS is using UTC). In the case the HCDMU is*

using UTC to specify the on board time, there should be no difference between THSK and the CCS/I-EGSE system time.

3.3.2 SPIRE-IST-COLD-DRCU-ON-P

Version	2.4
Date	6th December 2007
Purpose	To switch on the SPIRE DRCU PRIME and start generating housekeeping
Initial configuration	SPIRE DPU PRIME is ON and DRCU PRIME is switched OFF
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced
Preconditions	• SPIRE FM DRCU is electrically integrated with the Herschel Satellite • SPIRE DRCU is switched OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	DRCU voltages show expected ‘ON’ values

Procedure steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-DRCU-START-P-STEP1.tcl	—	—	—	**Pass**
2	Check that THSK parameter is not refreshing anymore	THSK	Not refreshing	—	**Pass**
3	Check that TM2N parameter is not incrementing anymore	TM2N	Not incrementing	—	**Pass**
4	**Power ON the SPIRE DRCU PRIME unit using the dedicated spacecraft LCL line.**	—	—	—	**Pass**
5	Execute TCL script SPIRE-IST-COLD-DRCU-START-P-STEP2.tcl Note: The two TCs to clear the SPIRE Critical and Nominal HK reports will fail during execution of this script. These should be ignored because the HK reports will already have been cleared by script SPIRE-IST-COLD-DRCU-START-P-STEP1.tcl	—	—	—	**Pass**
6	Check that THSK parameter is again refreshing every second	THSK	Refreshing @ 1Hz	—	**Pass**
7	Check that TM2N parameter is again incrementing every second	TM2N	Incrementing by 1 @ 1Hz	—	**Pass**
8	Check that the SCU/DCU voltages show nominal values	SCUP5V SCUP9V SCUM9V BIASP5V BIASP9V BIASM9V	~ 5.2 ± 0.5V ~ 9.0 ± 0.2V ~ -9.0 ± 0.2V ~ 5.1 ± 0.5V ~ 9.0 ± 0.2V ~ -9.0 ± 0.2V	5.238V 9.087V -9.081V 5.18V 8.99V -9.05 **BIASTEMP 294.33K**	**Pass**
Test Result (Pass/Fail):					

3.3.3 SPIRE-IST-COLD-FUNC-SCU-02-P

Version	2.4
Date	6th December 2007
Purpose	SCU Nominal Science Contents Check PRIME
Initial configuration	SPIRE DPU and DRCU PRIME are switched ON, SPIRE HK is being produced
Final configuration	Unchanged
Preconditions	• **SPIRE-IST-COLD-DPU-ON-P** and **SPIRE-IST-COLD-DRCU-ON-P** procedures have been executed. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • I-EGSE is up and running • DPU AND OBS PARAMETERS & FUNCTIONAL TEST PARAMETERS displays are selected on the CCS
Duration	5 minutes (CUS = 35.0)
Success Criteria:	Test passed if : 1. The SPIRE HK parameter SCUFRAMECNT increments 0/31. 2. The SPIRE HK parameter SCUFRAMECNT increments 0x3FFF/1 3. No events are generated during the frame generation. QLA to give go ahead.
CUS Parameters	CUS parameter - scuframes = 0x1f = 31

Test Procedure:

Step#	Action
0	Open **SCU_PARAMETERS** display on SCOS Alpha Numeric Displays.
1	Write down the initial value of the SCUFRAMECNT and TM5N parameters located in SCU_PARAMETERS display.
2	Run QLA script FUNC-SCU-02.py on QLA console.
3	Write down the final value of SCUFRAMECNT and TM5N.
4	Contingency: If test fails repeat steps 1 to 4.

Test Log:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-FUNC-SCU-02-P.tcl	SCUFRAMECNT TM5N	0/31 0x3FFF/1		**PASS**

Start time @: 06:40
End time @: 06:41
OBSID:0xb0001031
Comments:
SCU frame count 0 at start and 31 at end

```
FUNC-SCU-02 version: 1.5

Housekeeping @  Fri Mar 07 06:41:40 UTC 2008
SCU Science @ Fri Mar 07 06:41:36 UTC 2008

 Name           HSK value  SCU value     Equal (within 10 raw units)?
TCHTRV          18.0       18.0          True
PCALCURR        10.0       10.0          True
SCAL4CURR       8.0        8.0           True
SCAL2CURR       10.0       9.0           True
PCALV           10.0       8.0           True
SCAL4V          10.0       10.0          True
SCAL2V          9.0        10.0          True
PUMPHTRTEMP     65467.0    65467.0       True
PUMPHSTEMP      90.0       90.0          True
EVAPHSTEMP      65466.0    65466.0       True
SHUNTTEMP       65316.0    65317.0       True
EMCFILTEMP      65524.0    65525.0       True
SL0TEMP         184.0      181.0         True
PL0TEMP         65390.0    65389.0       True
OPTTEMP         37.0       37.0          True
BAFTEMP         18.0       16.0          True
BSMIFTEMP       64.0       64.0          True
SCAL2TEMP       7.0        7.0           True
SCAL4TEMP       65444.0    65445.0       True
SCALTEMP        65462.0    65462.0       True
SMECIFTEMP      8.0        9.0           True
SMECTEMP        65466.0    65466.0       True
BSMTEMP         118.0      118.0         True
SUBKTEMP        32754.0    32756.0       True
```

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

3.3.4 SPIRE-IST-COLD-FUNC-SCU-03-P

Test Id:	SPIRE-IST-COLD-FUNC-SCU-03-P
Test Purpose:	FPU DC Thermometry Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Duration	8 minutes (CUS = 38.0)
Success Criteria:	Test passed if thermometry channels show temperature values indicating a correct functioning of the sensor, not open/short-circuited. If ANY reading is anomalous check RAW sensor reading. **Open Circuit Criterion:** **RAW reading in the range [0, -100]** **Short Circuit Criterion:** **RAW reading of -32768**
CUS Parameters	CUS parameter dcparam = 0xffff = 65535

Test Procedure:

Step#	Action
1	Run QLA script FUNC-SCU-03.py on QLA console.
2	Run SPIRE-IST-COLD-FUNC-SCU-03-P.tcl test procedure from the CCS.
3	Contingency: If test fails: 1. Execute SCU_OFF procedure. 2. Execute SPIRE-IST-COLD-FUNC-SCU-03-P.tcl procedure. 3. Repeat step 1 of the Test Procedure.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-SCU-03	**SCUTEMPSTAT**	**0xFFFF/0xFFFF**	**0xFFFF/0xFFFF**	**N/A**	PASS

Start time @: 06:43
End time @: 06:44
OBSID: 0xb0001032

Comments:
L0 ~4.5K
L1 ~7.4K

```
SCU-03 Thermometry Check
OBSID = 0xb0001032

PUMPHTRTEMP  4.52   57625
PUMPHSTEMP   5.37   55834
EVAPHSTMP    5.20   55894
SHUNTTEMP    4.25   53367
EMCFILTMP    7.37   61637
SL0TEMP      4.25   53556
PL0TEMP      4.30   54020
OPTTEMP      7.41   59700
BAFTEMP      7.90   60708
BSMIFTEMP    7.47   58909
SCAL2TEMP    7.43   60005
SCAL4TEMP    7.31   60027
SCALTEMP     7.35   59596
SMECIFTEMP   7.23   58810
SMECTEMP     7.24   49730
BSMTEMP      7.39   40453
```

3.3.5 SPIRE-IST-COLD-FUNC-SCU-06-P

Test Id:	SPIRE-IST-COLD-FUNC-SCU-06-P
Test Purpose:	SCU/FPU AC Thermometry Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Duration	2 minutes
Success Criteria:	At ~ 4K the SUBKTEMP reading should calibration should start being in range. **Open Circuit Criterion:** **RAW reading in the range 0 -100** **Short Circuit Criterion:** **RAW reading of -32768**
CUS Parameters	acparam = 0x1

Test Procedure:

Step#	Action
1	Run SPIRE-IST-COLD-FUNC-SCU-06-P.tcl test procedure from the CCS.
2	Contingency: If test fails : 1. Send manual command: SEND_DRCU_COMMAND Parameter1 = 0xA0860000 Parameter2 = 0 2. Then repeat steps 1 and 2 of the Test Procedure. **Note:** **If the test fails and the SUBKTEMP channel is switched OFF manually, the expected value before/after execution of FUNC-SCU-06 for SUBKSTAT is 0/1**

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-SCU-06	**SUBKSTAT** **SUBKTEMP**	**0/1** **He I (~4K)** **He II (~1.7K)**	0/1	**N/A**	PASS

Start time @: 06:47
End time @: 06:48
OBSID: 0xb0001033

Comments:
SUBKTEMP ~4.36K

QLA script output file: FUNC-SCU-06_B0001033.txt

SCU-06
Start time @: 07-Mar 06:49:42
End time @: 07-Mar 06:49:55
OBSID: 0xB0001033

SUBKSTAT:
Start value: 0x0
End value: 0x1

SUBKTEMP
RAW value before: 32757

RAW value after: 32616
Converted after: 4293 mK

3.3.6 SPIRE-IST-COLD-FUNC-SCU-07-P

Test Id:	**SPIRE-IST-COLD-FUNC-SCU-07-P**
Test Purpose:	Sorption Cooler Heater Check (Not at He II)
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Constraints	**This test should not be performed at He II temperatures, unless specifically instructed to do so by the I-EGSE staff.**
Duration	5 minutes (CUS 95.0)
Success Criteria:	Test passed if : • Sorption cooler heat switches and pump heater show expected voltages • PCALCURR HK parameter shows the commanded current. • PCALV parameter shows a linear increase proportional to the bias applied. (the proportionality constant in this case should be the PCAL resistor value) i.e.

SCU HK parameter	RAW	Converted
SPHSV	**~12715**	**~323mV**
EVHSV	**~12715**	**~323mV**
SPHTRV	**~14390**	**~ 8 V**

CUS Parameters	evaphs = 0.804 pumphs = 0.804 pumpht = 21.85

Procedure Steps:

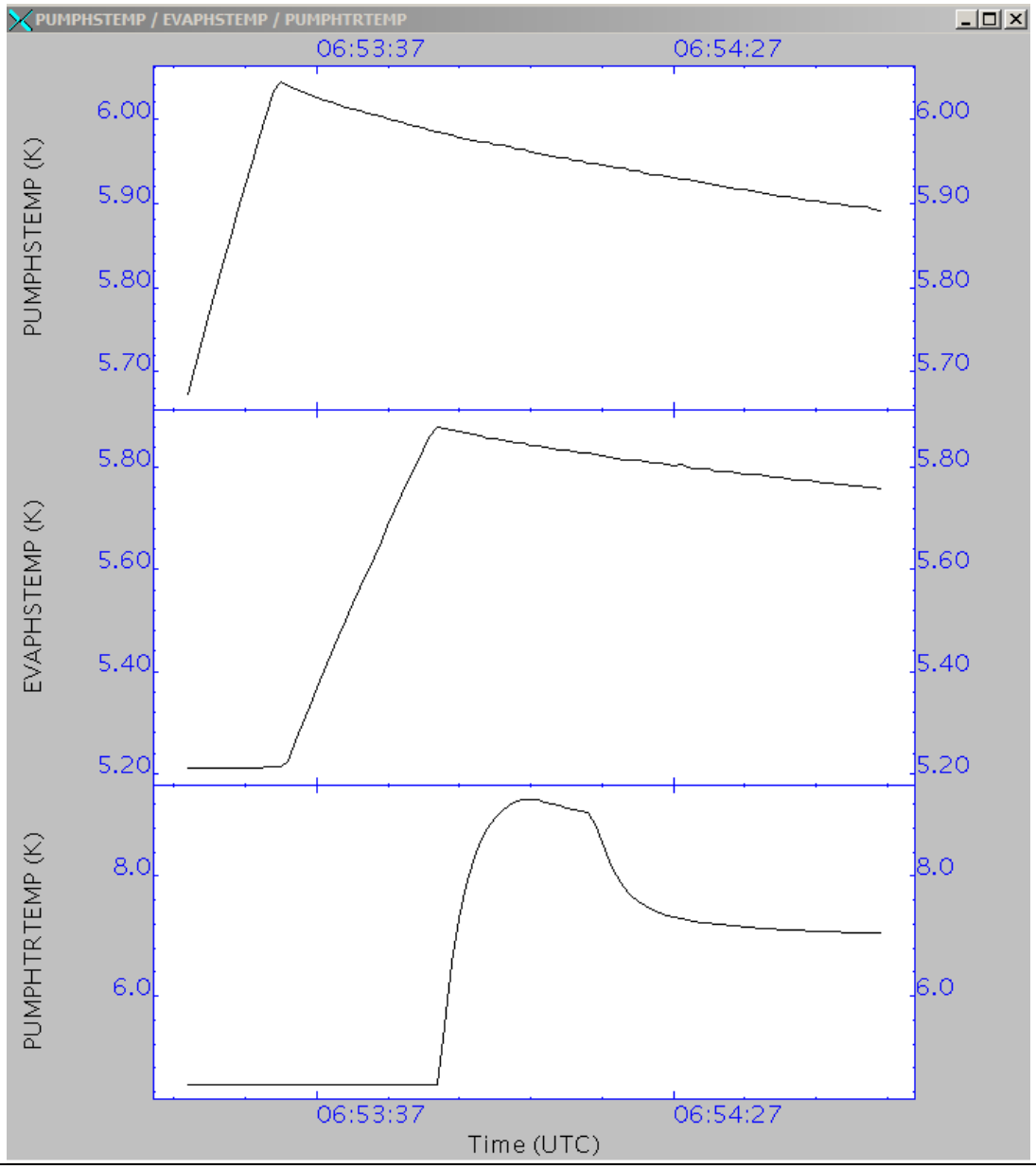
Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1.	**Open** SCU_PARAMETERS **display on SCOS Alpha Numeric Displays.**				
2.	Run SPIRE-IST-COLD-FUNC-SCU-07-P.tcl test procedure from the CCS.				
3.	Execute TCL script SPIRE-IST-COLD-FUNC-SCU-07-P.tcl	—	—	—	
4.	**Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk**	BBFULLTYPE	Cooler_Htr_Chk		
5.	Record the value of parameter SPHSV – the Sorption Pump Heat Switch Voltage. *This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.*	SPHSV – mV	0/~323/0		
6.	Record the value of parameter EVHSV – the Evaporator Heat Switch Voltage. *This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.*	EVHSV – mV	0/~323/0		
7.	Record the value of parameter SPHTRV – the Sorption Pump Heater Voltage. *This voltage stays on for ~20 seconds.Wait for the voltage to go to zero to continue.*	SPHTRV – V	0/~8.8/0		
8.	**Wait for the I-EGSE staff to confirm the success or failure of this test. If test fails repeat.**	—	—	—	
Test Result (Pass/Fail):					

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-SCU-07-P.tcl	**SPHSV** **EVHSV** **SPHTRV**	**0/ ~ 323 mV** **0/ ~ 323 mV** **0/ ~ 8.8 V**	~0. / 324.44 mV ~0 / 324.30 mV ~0 / 8.85V	**N/A**	

Start time @: 06:53
End time @: 06:54
OBSID: 0xb0001034

Comments: QLA Plots of PUMPHSTEMP, EVAPHSTEMP and EVAPHSTEMP



3.3.7 SPIRE-IST-COLD-FUNC-PCAL-01-P

Test Id:	SPIRE-IST-COLD-FUNC-PCAL-01-P
Test Purpose:	Photometer Calibrator Characterisation
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Duration	5 minutes (CUS 216.0)
Success Criteria:	Test passed if : • PCALCURR HK parameter shows the commanded current. • PCALV parameter shows a linear increase proportional to the bias applied. (the proportionality constant in this case should be the PCAL resistor value)

CUS Parameters	p_start = 1.0; // Start input bias (mA)
	p_end = 7.0; // End input bias (mA)
	p_step = 1.0; // Step input bias (mA)

Test Procedure

Step#	Action
1	Run QLA script FUNC-PCAL-01.py on QLA console.
2	Run SPIRE-IST-COLD-FUNC-PCAL-01-P test procedure from the CCS.
3	Contingency: If test fails repeat steps 1 and 2.

Test Log:

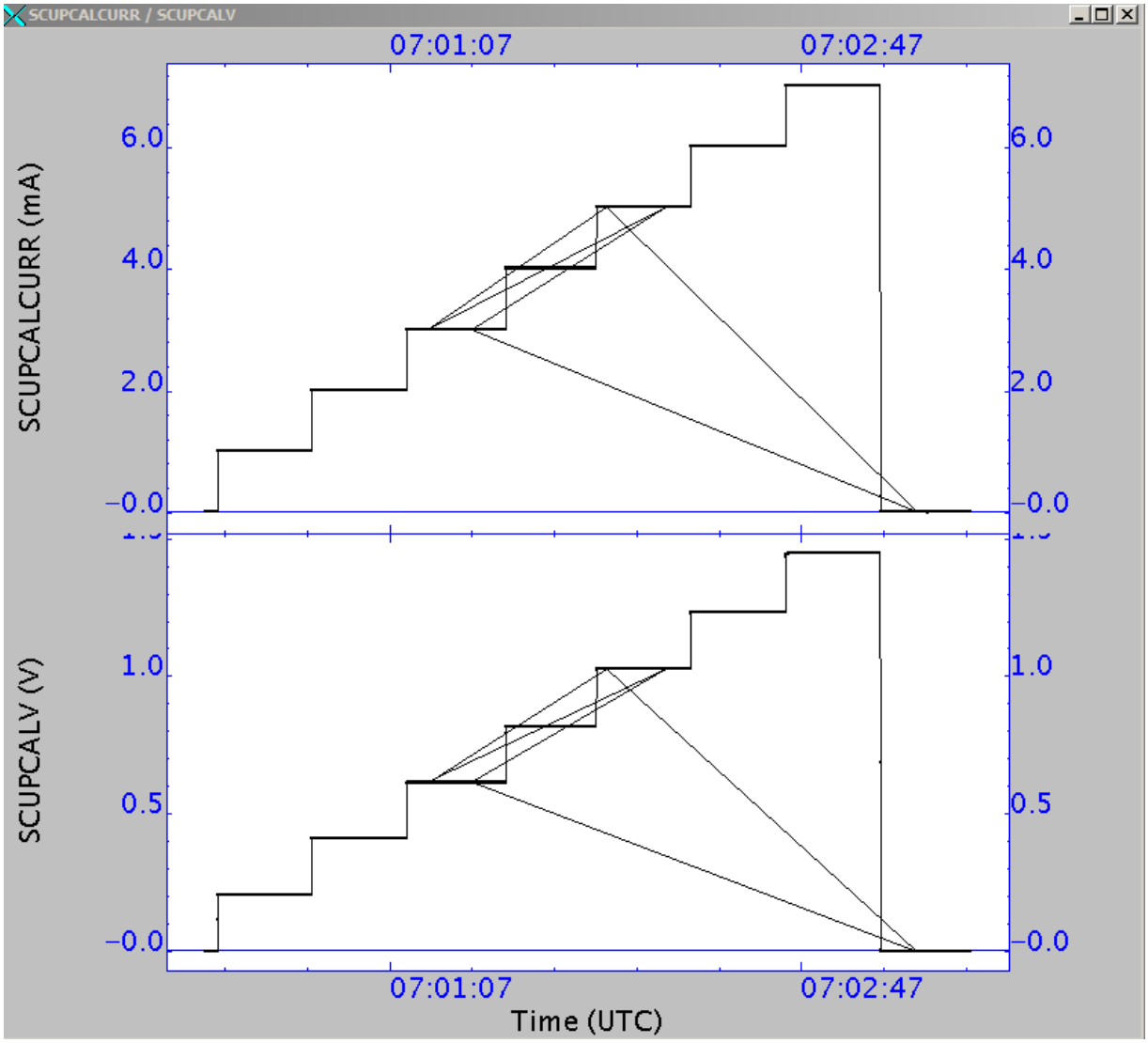
Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-PCAL-01-P	**PCALCURR PCALV**	**Starts at 0 then steps through 1, 2, 3 .. and ends at 7mA**	See plot below	**N/A**	PASS

Start time @: 07:00
End time @: 07:05
OBSID: 0xb0001035

Comments:

Monitored PCAL current on SCOS – PCAL current settings OK

QLA script produces new plots for every current level – normally there is a single plot. Also the time series plots of PCALCURR and PCALV show lines crisscrossing.



These problems appear to be due to the HK and science packets not arriving in time order.

PCALCURR / PCALV / THSK / OBSID

PCALCURR mA	PCALV V	THSK UTC	OBSID None
2.01484	0.408247	07-Mar 07:01:03	2.952794165E9
2.01484	0.408298	07-Mar 07:01:04	2.952794165E9
2.01484	0.408349	07-Mar 07:01:05	2.952794165E9
2.01484	0.408247	07-Mar 07:01:06	2.952794165E9
2.01484	0.408298	07-Mar 07:01:07	2.952794165E9
2.01484	0.408298	07-Mar 07:01:08	2.952794165E9
2.01484	0.408247	07-Mar 07:01:09	2.952794165E9
2.01484	0.408349	07-Mar 07:01:10	2.952794165E9
3.025033	0.61291	07-Mar 07:01:11	2.952794165E9
3.024784	0.61291	07-Mar 07:01:12	2.952794165E9
3.024784	0.612859	07-Mar 07:01:13	2.952794165E9
3.024784	0.61291	07-Mar 07:01:14	2.952794165E9
3.025033	0.61291	07-Mar 07:01:15	2.952794165E9
3.025531	0.61291	07-Mar 07:01:16	2.952794165E9
3.025033	0.612859	07-Mar 07:01:17	2.952794165E9
5.044671999999999	1.025653	07-Mar 07:02:02	2.952794165E9
5.044671999999999	1.0255509999999999	07-Mar 07:02:03	2.952794165E9
5.0449209999999995	1.0254489999999998	07-Mar 07:02:04	2.952794165E9
5.045419	1.0254489999999998	07-Mar 07:02:05	2.952794165E9
5.0449209999999995	1.0255509999999999	07-Mar 07:02:06	2.952794165E9
5.044671999999999	1.0254489999999998	07-Mar 07:02:07	2.952794165E9
5.044671999999999	1.0255509999999999	07-Mar 07:02:08	2.952794165E9
5.0449209999999995	1.025602	07-Mar 07:02:09	2.952794165E9
5.044671999999999	1.025602	07-Mar 07:02:10	2.952794165E9
5.0449209999999995	1.025602	07-Mar 07:02:11	2.952794165E9
5.0449209999999995	1.025602	07-Mar 07:02:12	2.952794165E9
5.04517	1.025602	07-Mar 07:02:13	2.952794165E9
5.044671999999999	1.0254489999999998	07-Mar 07:02:14	2.952794165E9
5.044671999999999	1.025602	07-Mar 07:02:15	2.952794165E9
3.025033	0.61291	07-Mar 07:01:18	2.952794165E9
3.024784	0.61291	07-Mar 07:01:19	2.952794165E9
3.024784	0.61291	07-Mar 07:01:20	2.952794165E9
3.024784	0.613012	07-Mar 07:01:21	2.952794165E9
3.024784	0.61291	07-Mar 07:01:22	2.952794165E9
3.025531	0.612859	07-Mar 07:01:23	2.952794165E9
3.024784	0.612859	07-Mar 07:01:24	2.952794165E9
3.024784	0.612961	07-Mar 07:01:25	2.952794165E9
3.024784	0.61291	07-Mar 07:01:26	2.952794165E9
3.025033	0.612859	07-Mar 07:01:27	2.952794165E9
3.024784	0.612859	07-Mar 07:01:28	2.952794165E9
5.044671999999999	1.025704	07-Mar 07:02:16	2.952794165E9
5.0449209999999995	1.025602	07-Mar 07:02:17	2.952794165E9

3.3.8 SPIRE-IST-COLD-FUNC-SCAL-01-P

Test Id:	SPIRE-IST-COLD-FUNC-SCAL-01-P
Test Purpose:	Spectrometer Calibrator Characterisation
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON
Duration	18 minutes (CUS 926)
Success Criteria:	Test passed if : • SCAL4CURR HK parameter shows the commanded current sequence (1,2,3,4,5,5.5mA) • SCAL2CURR HK parameter shows the commanded current sequence(1,2,3,4,5,5.5mA) • SCA2LV parameter shows a linear increase proportional to the bias applied. (the proportionality constant in this case should be the SCAL2V resistor value) • SCAL4V parameter shows a linear increase proportional to the bias applied. (the proportionality constant in this case should be the SCAL4V resistor value) • SCAL2TEMP and SCAL4TEMP values follow the increased bias settings
CUS Parameters	s2_start = 1.0 \\ S2 Bias RAW s2_end = 5.0 \\ S2 Bias RAW s2_step = 1. 0 \\ S2 Bias RAW s4_start = 1.0 \\ S4 Bias RAW s4_end = 5.0 \\ S4 Bias RAW s4_step = 1.0 \\ S4 Bias RAW

Test Procedure

Step#	Action
1	Run QLA script FUNC-SCAL-01.py on QLA console.
2	Run SPIRE-IST-COLD-FUNC-SCAL-01-P test procedure from the CSS.
3	Contingency: If test fails repeat steps 1 and 2.

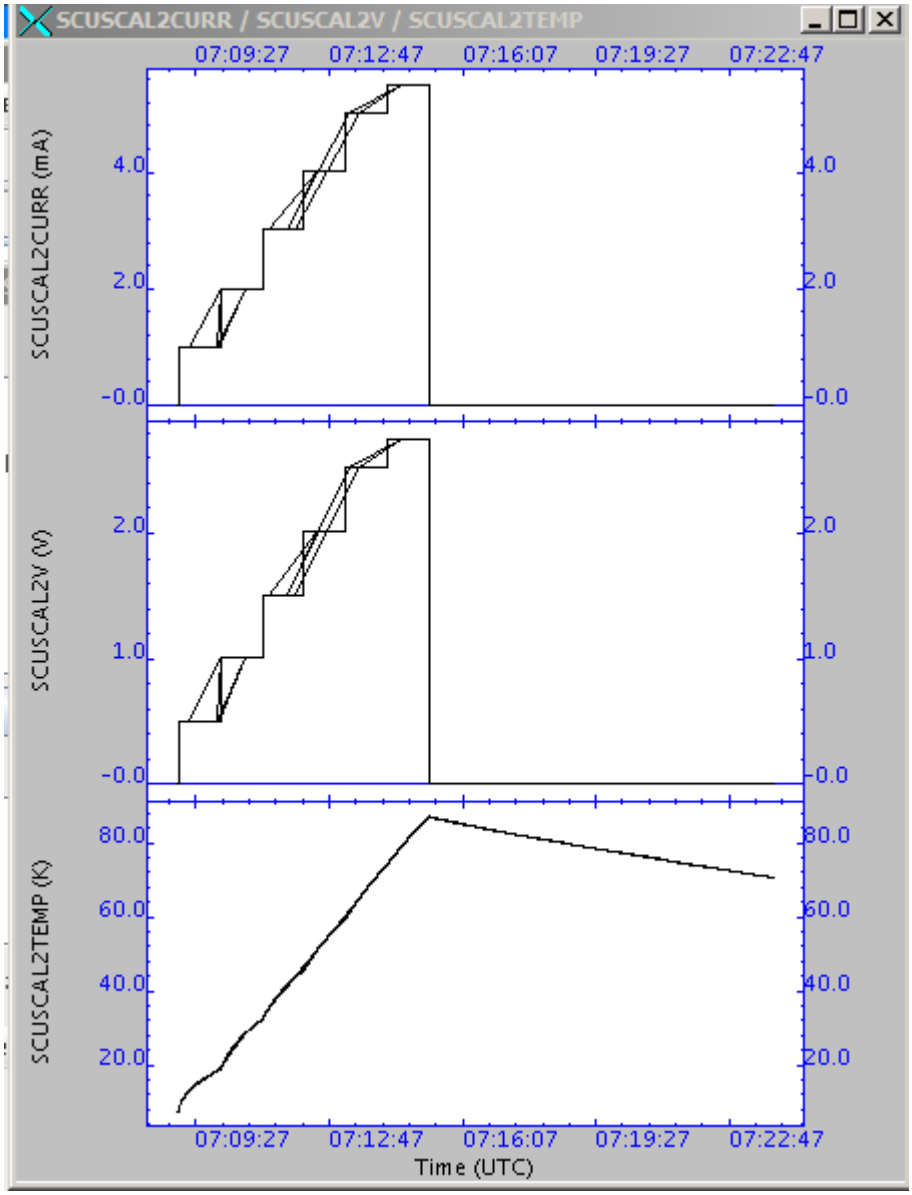
Test Log:

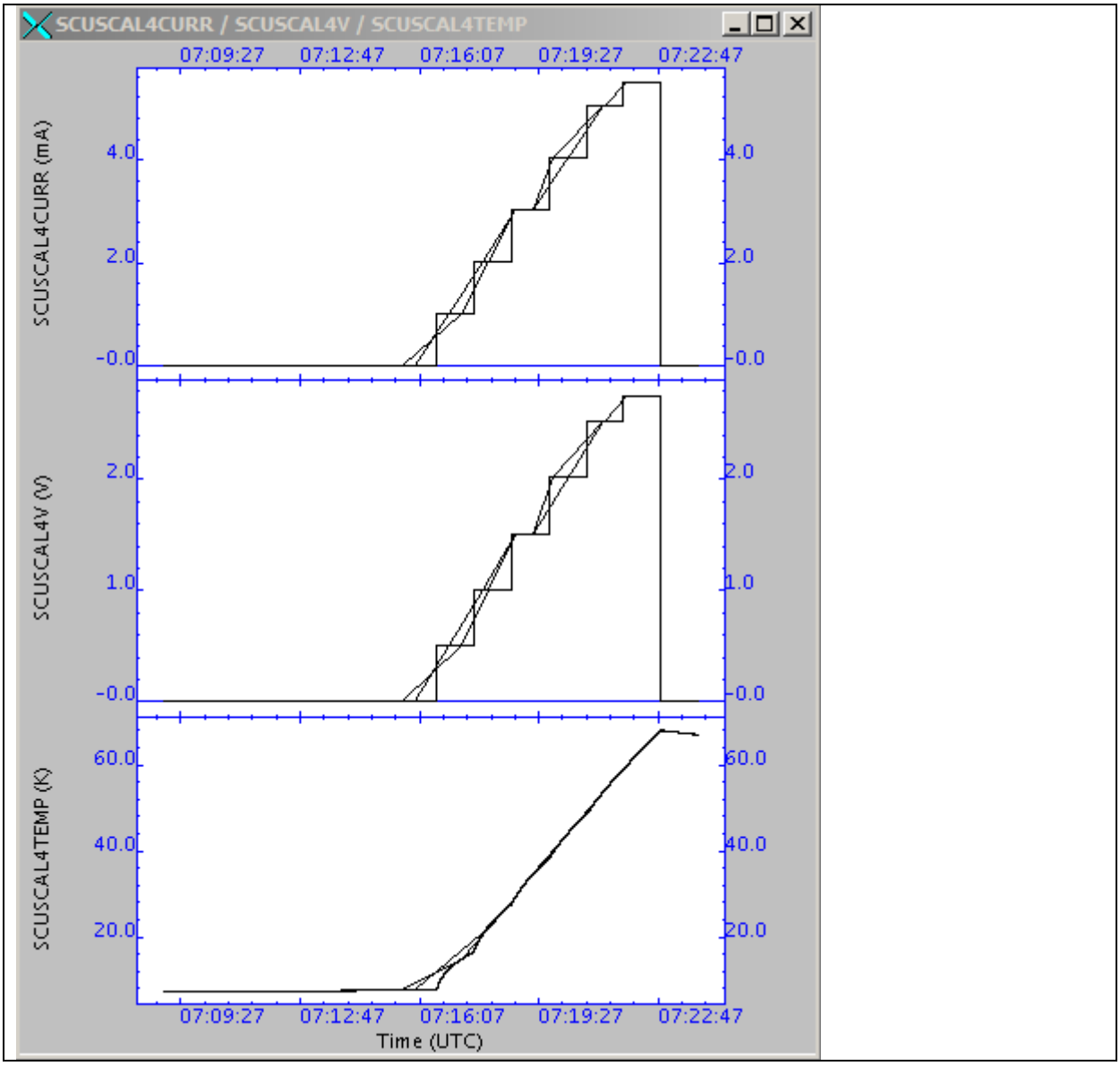
Test Id	Key Parameter(s)	Expected Value Before/During test	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-SCAL-01-P	**SCAL2CURR** **SCAL4CURR** **SCAL2V** **SCAL4V** **SCAL2TEMP** **SCAL4TEMP**	**0/1,2,3,4,5,5.5mA** **0/1,2,3,4,5,5.5mA** **0/0.5,1.0,1.5,2.0,2.5.2.75V** **0/0.5,1.0,1.5,2.0,2.5.2.75V**	See plots below	**N/A**	Pass
Note: First SCAL2CURR starts at 0 then steps through 1, 2, 3 .. and ends at 7mA, then the same for SCAL4CURR					

Start time @: 07:08
End time @: 07:23
OBSID: 0xb0001036

Comments: Test completed successfully. SCAL2 and SCAL4 temperatures on SCOS both at ~64K at end of test.

TM packets arriving in wrong time order again produce crisscrossing lines on the QLA plots.




SCUSCAL4CURR / SCUSCAL4V / SCUSCAL4TEMP
07:09:27
07:12:47
07:16:07
07:19:27
07:22:47
SCUSCAL4CURR (mA)
4.0
2.0
-0.0
SCUSCAL4V (V)
2.0
1.0
-0.0
SCUSCAL4TEMP (K)
60.0
40.0
20.0
Time (UTC)

3.3.9 SPIRE-IST-COLD-FUNC-MCU-01-P

Test Id:	SPIRE-IST-COLD-FUNC-MCU-01-P
Test Purpose:	MCU Boot Check
Initial Configuration:	DRCU_ON + AC/DC thermometry ON
Final Configuration:	DRCU_ON + AC/DC thermometry ON +MCU ON
Duration	5 mins (CUS 64.0)
Success Criteria:	Test passed if: 1. MCU boots. 2. MCU voltages show expected values. 3. MAC Board Temperature Reading shows ambient temperature.

Test Procedure:

Step#	Action
1	Run SPIRE-IST-COLD-FUNC-MCU-01-P test procedure from the CCS.
2	When procedure is finished, write down 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	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-MCU-01-P	MCUP5V MCUP15V MCUP14V MCUM14V MCUM15V MCUMACTEMP MCUBSMTEMP MCUSMECTEMP	N/A/ ~ 5V N/A / ~15V N/A / ~ 14V N/A / ~ -14V N/A / ~ -15V N/A / ~ 300K N/A / ~ 300K N/A / ~ 300K	5.01 V 15.54 V 14.15V -14.47 V -15.63 V 291.61 K 296.60 K 296.20 K	N/A	PASS

Start time @: 07:38
End time @: 07:40

OBSID: 0xb0001037
Comments:
MCU booted OK

3.3.10 SPIRE-IST-COLD-FUNC-MCU-03-P

Test Id:	**SPIRE-IST-COLD-FUNC-MCU-03-P**
Test Purpose:	MCU Nominal Science Generation Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Duration	5 mins (CUS 69.0)
Success Criteria:	Test passed if : 1. MCU produces each type of the frames requested and with the following characteristics. 2. 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						

CUS Parameters	n_eng_frames = 100; //number of engineering frames
	f_eng_frames = 64.1; //frequency of engineering frames generation
	n_smec_frames = 100; //number of smec frames
	f_smec_frames = 250.0; //frequency of smec frames generation
	n_bsm_frames = 100; //number of bsm frames
	f_bsm_frames = 64.1; //frequency of bsm frames generation
	ftime = 10; //time for continuous generation

Test Procedure:

Step#	Action
1	Write down the current value of MCUFRAMECNT located in MCU_PARAMETERS display
2	Run SPIRE-IST-COLD-FUNC-MCU-03-P test procedure from the CCS.
3	When test is finished Write down the current value of MCUFRAMECNT.
4	Contingency: If test fails repeat steps 1 to 4.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-MCU-03-P.tcl	**MCUFRAMECNT**	**0/ ~ 297**	**0 / 297**		Pass

Start time @: 07:41
End time @: 07:42
OBSID: 0xb0001038

Comments: QLA produced the following files

QLA-MCU-03_B0001038_8901.txt

Housekeeping Fri Mar 07 07:41:25 UTC 2008
Science Fri Mar 07 07:41:24 UTC 2008

Name	HK before	Science	HK after	Equal (within 10%)?
SMECENCSIG1	12403.0	12406.0	12405.0	True
SMECENCSIG2	20068.0	20070.0	20067.0	True
SMECLVDTDCSIG	32759.0	32758.0	32761.0	True
SMECLVDTACSIG	27325.0	27324.0	27320.0	True
SMECMOTORCURR	32780.0	32779.0	32778.0	True
SMECMOTORVOLT	32775.0	32772.0	32777.0	True
CHOPSENSSIG	32764.0	32762.0	32764.0	True
CHOPMOTORCURR	32776.0	32776.0	32777.0	True
CHOPMOTORVOLT	32768.0	32766.0	32760.0	True
JIGGSENSSIG	32758.0	32754.0	32752.0	True
JIGGMOTORCURR	32773.0	32774.0	32775.0	True
JIGGMOTORVOLT	32764.0	32770.0	32762.0	True

QLA-MCU-03_B0001038_8902.txt

Housekeeping Fri Mar 07 07:41:42 UTC 2008
Science Fri Mar 07 07:41:41 UTC 2008

Name	HK before	Science	HK after	Equal (within 10%)?
SMECENCPOSN	0.0	0.0	0.0	True
SMECENCFINEPOSN	0.0	0.0	0.0	True
SMECLVDTDCSIG	32759.0	32760.0	32758.0	True
SMECMOTORBEMF	4.0	4.0	9.0	True

QLA-MCU-03_B0001038_8903.txt

Housekeeping Fri Mar 07 07:41:58 UTC 2008
Science Fri Mar 07 07:41:57 UTC 2008

Name	HK before	Science	HK after	Equal (within 10%)?
CHOPSENSSIG	32762.0	32762.0	32761.0	True
CHOPDACVAL	32768.0	32768.0	32768.0	True
CHOPMOTORVOLT	32764.0	32768.0	32764.0	True
JIGGSENSSIG	32755.0	32757.0	32756.0	True
JIGGDACVAL	32768.0	32768.0	32768.0	True
JIGGMOTORVOLT	32766.0	32768.0	32767.0	True

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

3.3.11 SPIRE-IST-COLD-FUNC-BSM-01-P

Test Id:	SPIRE-IST-COLD-FUNC-BSM-01-P
Test Purpose:	BSM Switch ON Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON +MCU ON + BSM ON (open loop)
Duration	5 mins (CUS 24.0)
Success Criteria:	Test passed if: 1. CHOPSENSPWR HK parameter goes from 0 to 1 2. CHOPSENSIG HK parameter changes 3. JIGGSENSPWR HK parameter goes from 0 to 1 4. JIGGSENSSIG HK parameter changes

Test Procedure

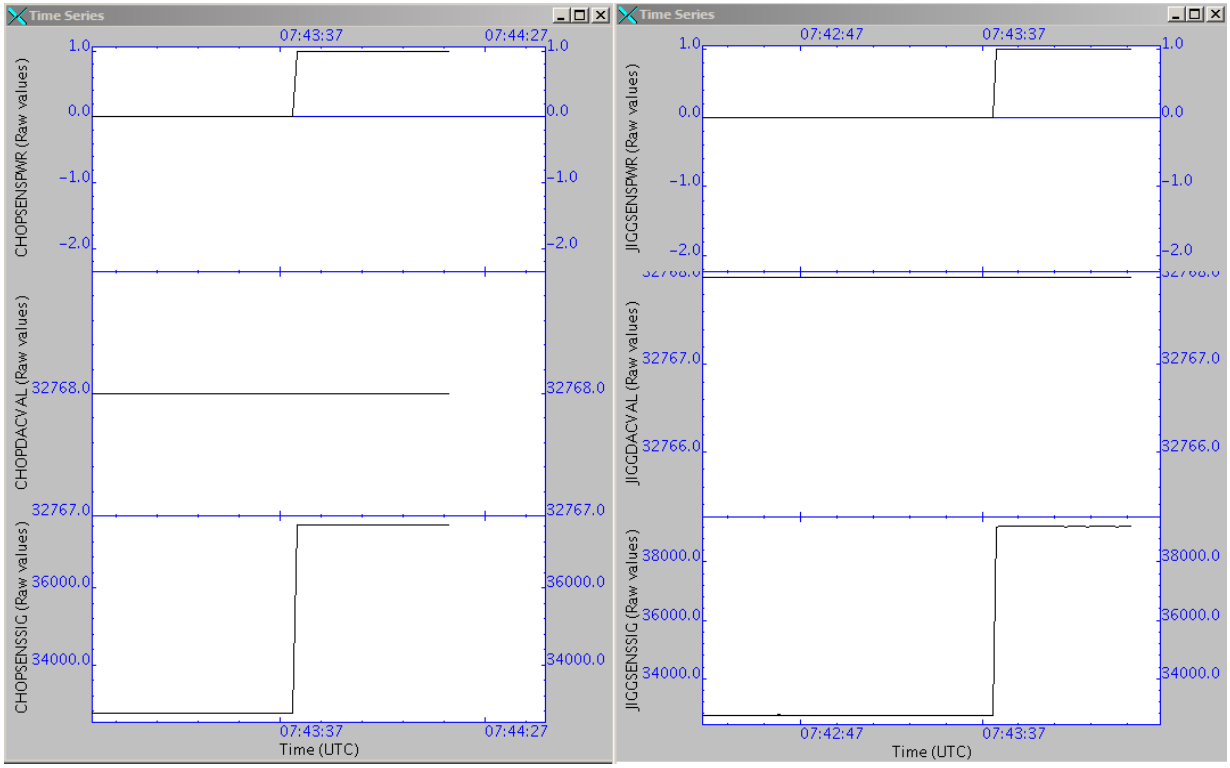
Step#	Action
1	Run SPIRE-IST-COLD-FUNC-BSM-01-P test procedure from the CCS.
2	When the test is finished record all the Key parameters noted below
3	Contingency: If test fails repeat steps 1 and 2.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
FUNC-BSM-01	**CHOPSENSPWR** **CHOPLOOPMODE** **CHOPSENSSIG** **JIGGSENSPWR** **JIGGLOOPMODE** **JIGGSENSSIG**	**0/1/1** **3/3** **?/?** **0/1/1** **3/3** **?/?**	0 / 1 3 / 3 7FFD / 9301 0 / 1 3 / 3 7FF4 / 9930	**N/A**	Pass

Start time @: 07:43
End time @: 07:44
OBSID: 0xb0001039

Comments:



3.3.12 SPIRE-IST-COLD-FUNC-BSM-03-P

Test Id:	SPIRE-IST-COLD-FUNC-BSM-03-P
Test Purpose:	BSM Open Loop dynamics Check
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)
Duration	5 mins (CUS 269.0)
Success Criteria:	Test passed if the chop sensor signal evolves in the same way as the positions set (i.e. if choppos2 > choppos1 ➔ chopsenssig2 > chopsenssig1) for each jiggle position.

CUS Parameters	frametype = "BSM"; // Specifyes MCU frame type [BSM,SMEC,BSM+SMEC,ENG,TEST]
	framerate = 64.0; // Specifies the frame rate
	j_start = 0x4000; // RAW jiggle target start position
	j_end = 0xc000; // RAW jiggle target end position
	j_step = 0x4000; // RAW jiggle target step in position
	j_delay = 2; // Time at each jiggle target position in seconds
	c_start = 0x3000; // RAW chop target start position
	c_end = 0xf000; // RAW chop target end position
	c_step = 0x1000; // RAW chop target step in position
	c_delay = 5; // Time at each chop target position in seconds

Test Procedure

Step#	Action
1	**On QLA open up 2 time series display with the following HK parameters in each display:** **Display 1:** *HK* : CHOPPOSN *BSM Nominal Science*: BSMCHOPMOTORCURR BSMCHOPSENSSIG BSMCHOPMOTORVOLT **Display2:** *HK* : JIGGPOSN *BSM Nominal Science*: BSMJIGGMOTORCURR BSMJIGGSENSSIG BSMJIGGMOTORVOLT
2	**Run SPIRE-IST-COLD-FUNC-BSM-03-P test procedure from the CCS**
3	Contingency: If test fails repeat step 2.

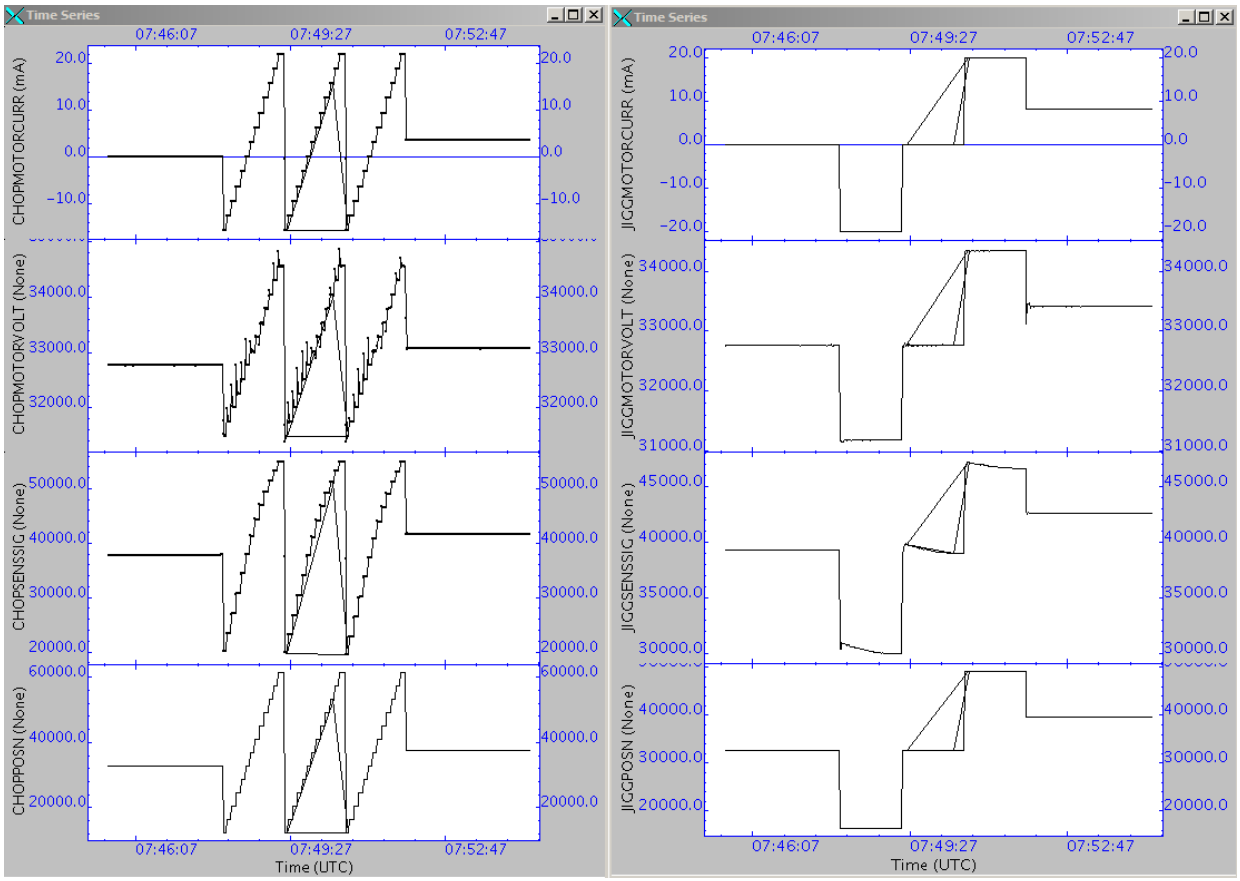
Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-BSM-03-P				N/A	**Pass**

Start time @: 07:48
End time @: 07:52
OBSID: 0xb000103a

Comments: Nominal behaviour.

QLA plots



3.3.13 SPIRE-IST-COLD-FUNC-BSM-05A-P

Test Id:	SPIRE-IST-COLD-FUNC-BSM-05A-P.tcl
Test Purpose:	BSM Open Loop chop test (Degraded operational mode check)
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)
Duration	5 mins (CUS 75.0)
Success Criteria:	**Note:** **The purpose of this test is to check the effectiveness of the dumping of the natural oscillations of the BSM in chop axis via motor bemf, through the use of the commendable motor resistance value.** **As it is now is just a check of the default motor resistance value.** **NO adjusting of this value should be attempted during this test.** **The success criteria are therefore not applicable.**

CUS Parameters	frametype = "BSM"; // Specifyes MCU frame type [BSM,SMEC,BSM+SMEC,ENG,TEST]
	framerate = 125.0; // Specifies the frame rate
	on_source_chop = 0xa000; // On source chop position
	on_source_jiggle = 0x8000; // On source jiggle position
	off_source_chop = 0x8000; // Off source chop position
	off_source_jiggle = 0x8000; // Off source jiggle position
	ncycles = 50; //Number of chop cycles
	chop_period = 500000; //period of chop cycles in microsec
	dcumode = 0; //Data type
	dcusample = 4; //Number of DCU samples per chop position
	dcudelay = 34959; //Dealy to start sampling the DCU
	bsmsample = 31; //Number of BSM samples per position

Test Procedure

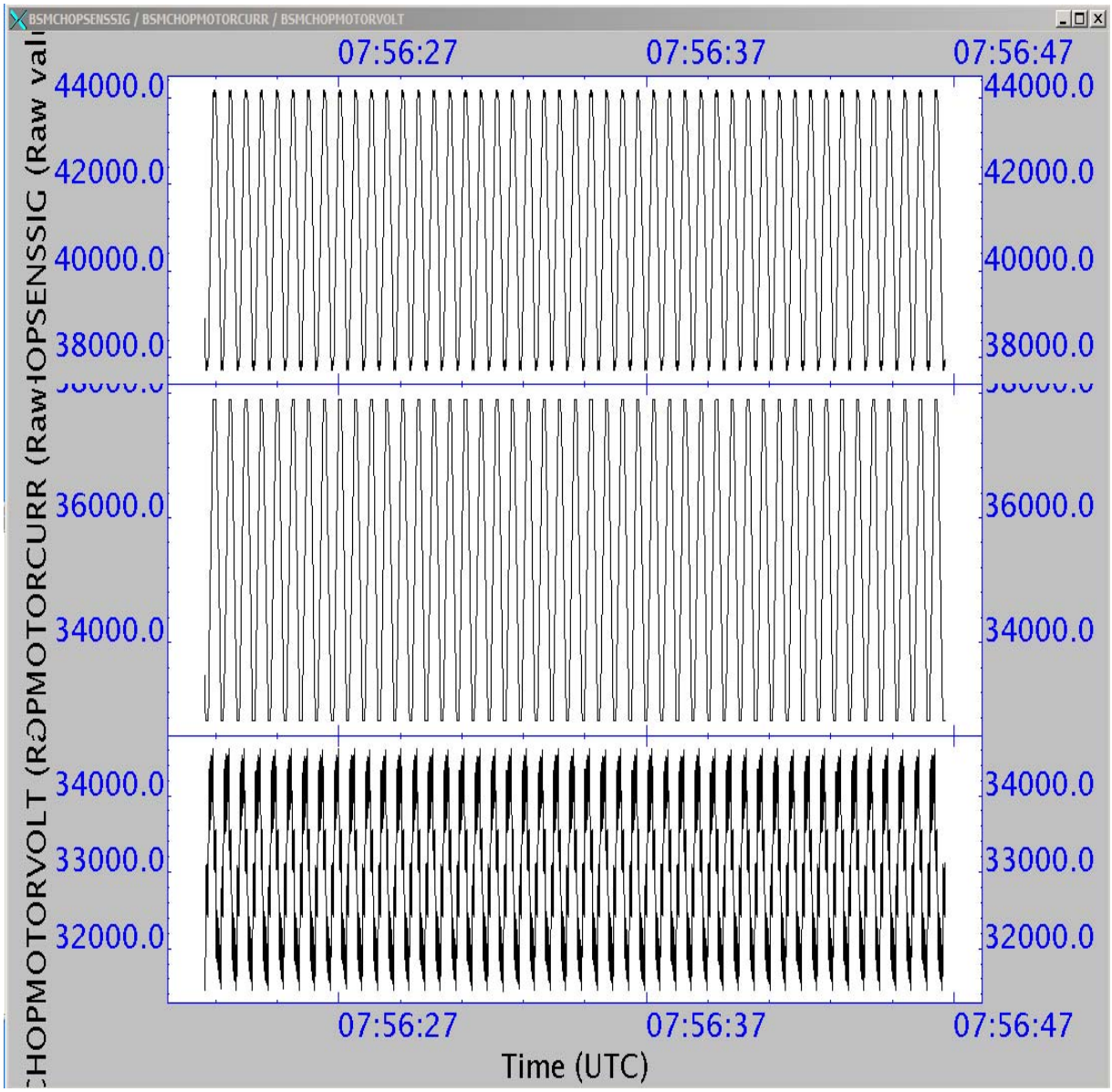
Step#	Action
1	**On QLA open up a time series display of HK parameters:** BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT
2	**Run SPIRE-IST-COLD-FUNC-BSM-05A-P.tcl test procedure from the CCS.**
3	Contingency: None contemplated.

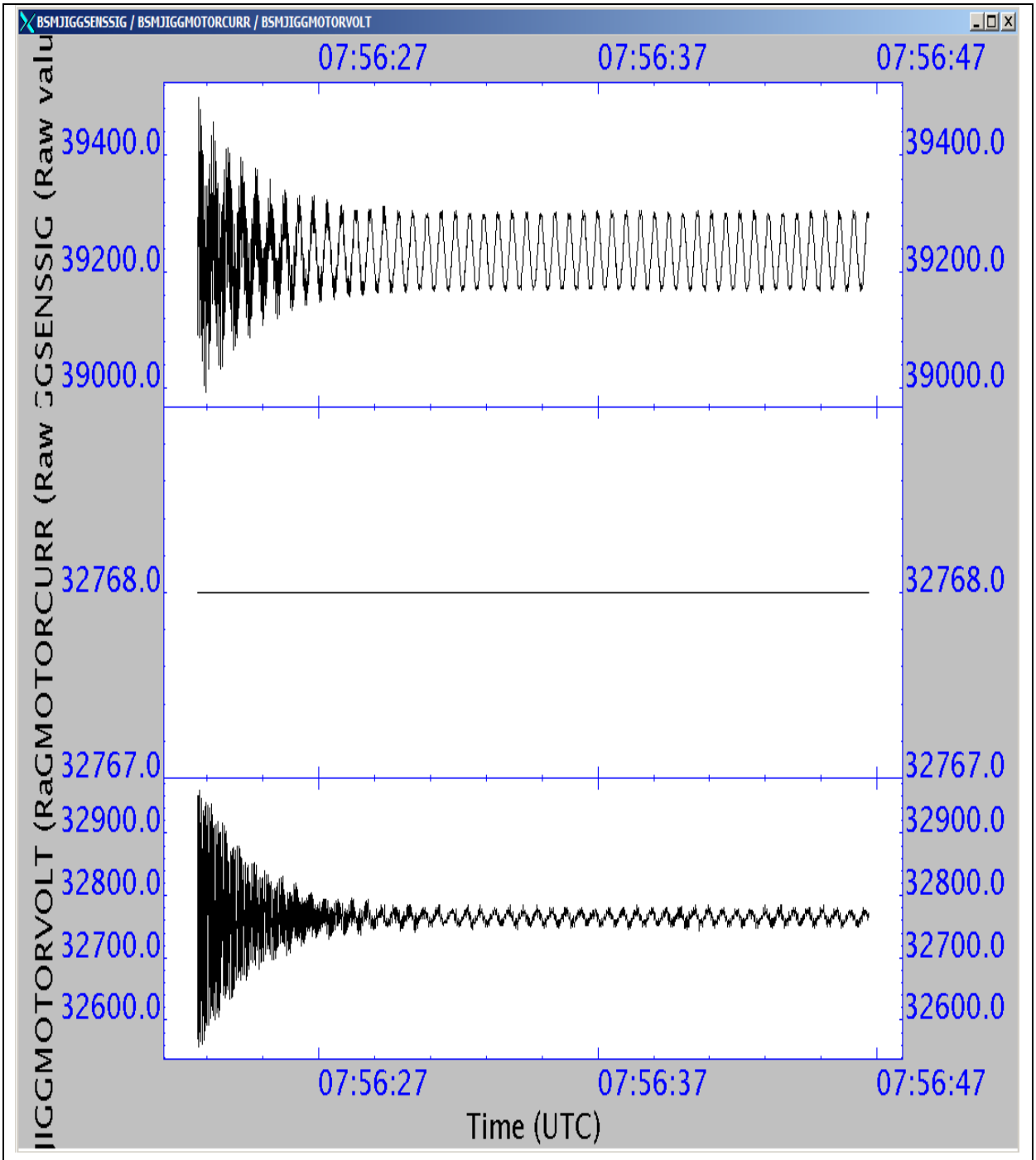
Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-BSM-05A-P.tcl	BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT	?/? ?/? ?/?		N/A	**Pass**

Start time @: 07:56
End time @: 07:58
OBSID: 0xb000103b

Comments:




BSMJIGGSENSSIG / BSMJIGGMOTORCURR / BSMJIGGMOTORVOLT
07:56:27
07:56:37
07:56:47
39400.0
39200.0
39000.0
32768.0
32767.0
32900.0
32800.0
32700.0
32600.0
Time (UTC)

3.3.14 SPIRE-IST-COLD-FUNC-BSM-05B-P

Test Id:	SPIRE-IST-COLD-FUNC-BSM-05B-P
Test Purpose:	BSM Close Loop chop test
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 (CLOSED loop)
Duration	5 mins (CUS 72.0)
Success Criteria:	**Note:** **Currently this test does not differ at ALL from the next one.** **In any case the success/fail criteria are NOT applicable for this test.**

CUS Parameters	frametype = "BSM"; // Specifyes MCU frame type [BSM,SMEC,BSM+SMEC,ENG,TEST]
	framerate = 125.0; // Specifies the frame rate
	on_source_chop = 0xb600; // On source chop position (46592)
	on_source_jiggle = 0x9a60; // On source jiggle position (39520)
	off_source_chop = 0x6a28; // Off source chop position (27176)
	off_source_jiggle = 0x9a60; // Off source jiggle position (39520)
	ncycles = 50; //Number of chop cycles
	chop_period = 500000; //period of chop cycles in microsec
	dcumode = 0; //Data type
	dcusample = 4; //Number of DCU samples per chop position
	dcudelay = 34959; //Dealy to start sampling the DCU
	bsmsample = 31; //Number of BSM samples per position

Test Procedure

Step#	Action
1	Execute SPIRE-IST-COLD-BSM-INIT-P.tcl from the CCS.
2	On QLA open up a time series display of HK parameters: BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT
3	Run SPIRE-IST-COLD-FUNC-BSM-05B-P.tcl test procedure from the CCS.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-BSM-INIT-P.tcl	**CHOPLOOPMODE** **JIGGLOOPMODE**	**3/-/1** **3/-/1**	**3/-/1** **3/-/1**	**N/A**	**Pass**
SPIRE-IST-COLD-FUNC-BSM-05B-P.tcl	**BSMCHOPSENSSIG** **BSMCHOPMOTORCURR** **BSMCHOPMOTORVOLT**	**?/?** **?/?** **?/?**	See plots below	**N/A**	**Pass**

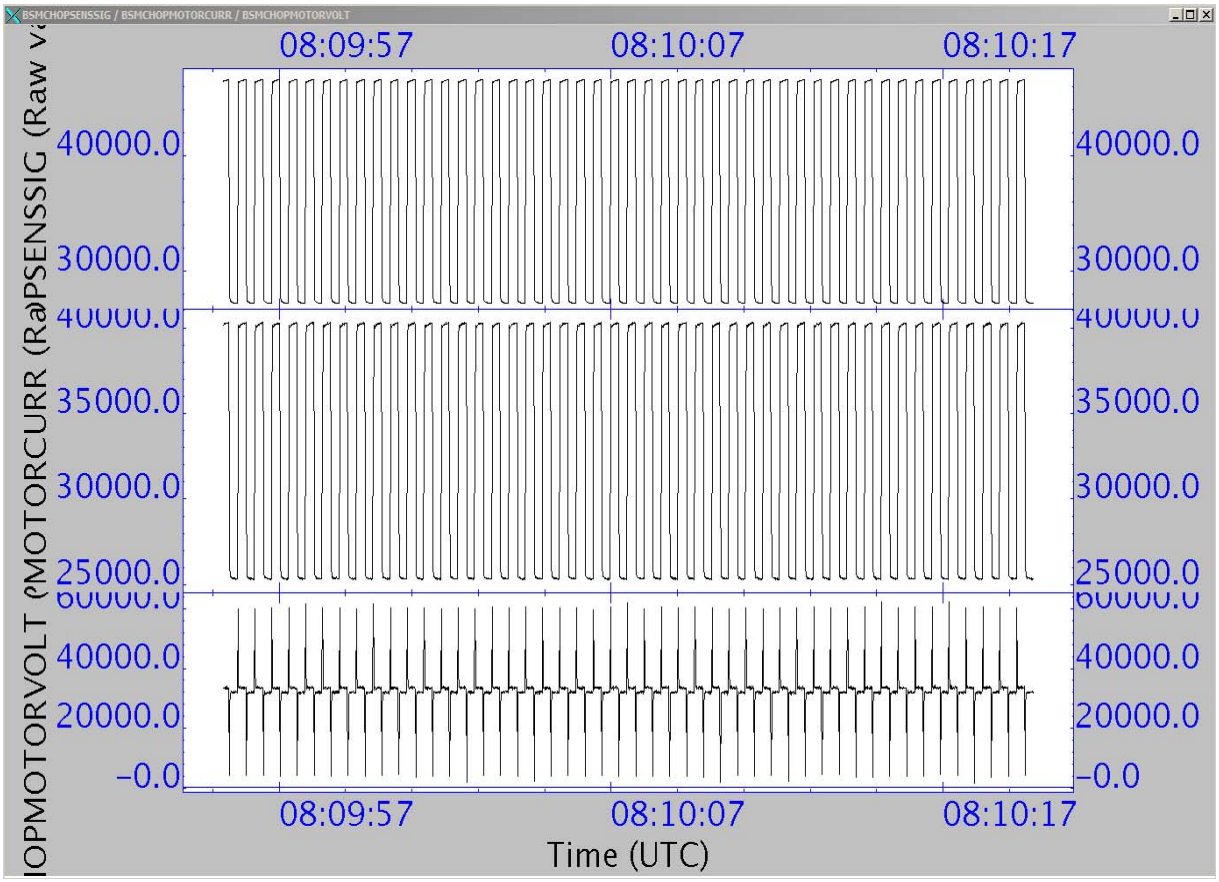
FUNC-BSM-05B
Start time: 08:03
End time: 08:04
OBSID: 0xb000103c

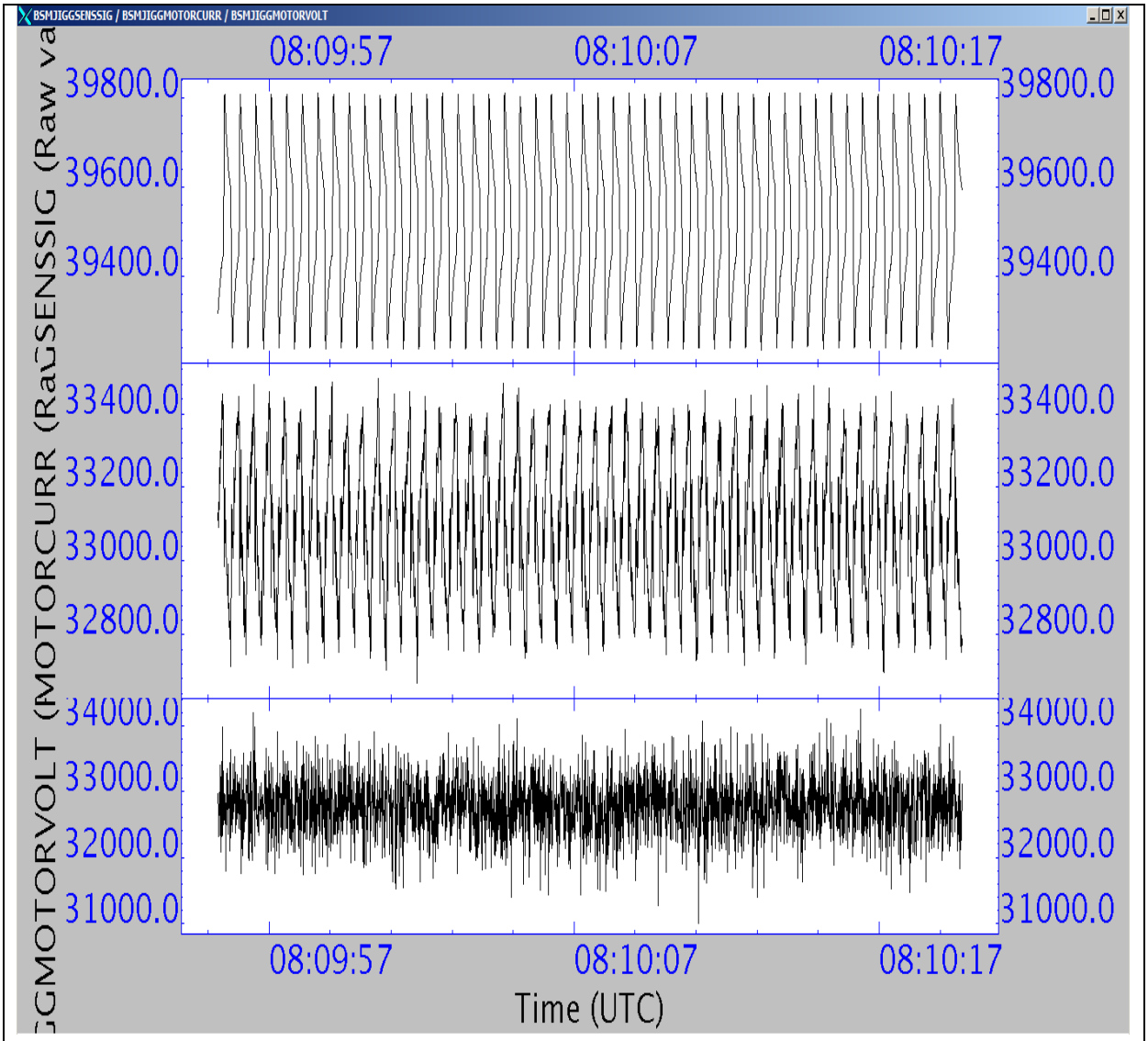
Comments: BSM_INIT had not been run. So this large chop throw test was done in open loop.

BSM_INIT:
Start Time: 08:07
End Time: 08:08
OBSID: 0xb000103d

FUNC-BSM-05B
Start time: 08:10
End time: 08:12
OBSID: 0xb000103e

Comments: Chopping OK. Settling time ~32 ms.




BSMJIGGSENSSIG / BSMJIGGMOTORCURR / BSMJIGGMOTORVOLT
08:09:57
08:10:07
08:10:17
39800.0
39600.0
39400.0
33400.0
33200.0
33000.0
32800.0
34000.0
33000.0
32000.0
31000.0
Time (UTC)

3.3.15 SPIRE-IST-COLD-FUNC-BSM-06-P

Test Id:	SPIRE-IST-COLD-FUNC-BSM-06-P
Test Purpose:	BSM Operational Mode Check
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)
Duration	5 mins (CUS 72.0)
Success Criteria:	**Note:** **The purpose of this test is to check the effectiveness of the BSM close loop initialisation procedure and the default PID parameters.** **If the dynamical behaviour of the BSM during chopping with these PID parameters is close or within requirements this indicates that the PID parameters used can be applied to cold testing with certain adjustment.** **If NOT these indicates that the PID parameters need further tuning BUT NOT TO BE DONE DURING THESE TEST.** **In any case the success/fail criteria are NOT applicable for this test.**

CUS Parameters	frametype = "BSM"; // Specifyes MCU frame type [BSM,SMEC,BSM+SMEC,ENG,TEST]
	framerate = 125.0; // Specifies the frame rate
	on_source_chop = 0x5279; // On source chop position (21113)
	on_source_jiggle = 0x8d00; // On source jiggle position (36096)
	off_source_chop = 0xad87; // Off source chop position (44423)
	off_source_jiggle = 0x8d00; // Off source jiggle position (36096)
	ncycles = 50; //Number of chop cycles
	chop_period = 500000; //period of chop cycles in microsec
	dcumode = 0; //Data type
	dcusample = 4; //Number of DCU samples per chop position
	dcudelay = 34959; //Dealy to start sampling the DCU
	bsmsample = 65535; //Number of BSM samples per position

Test Procedure

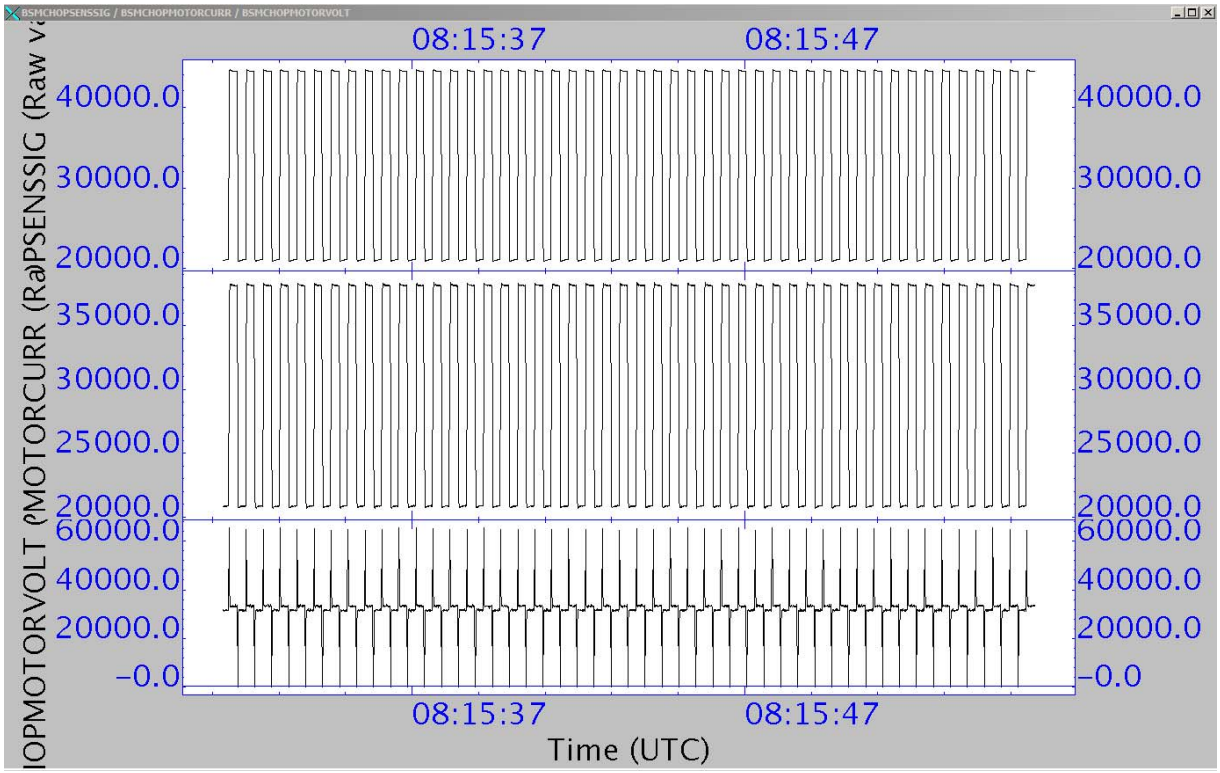
Step#	Action
1	**On QLA open up a time series display of science parameters:** BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT
2	**Run SPIRE-IST-COLD-FUNC-BSM-06-P test procedure from the CCS.**

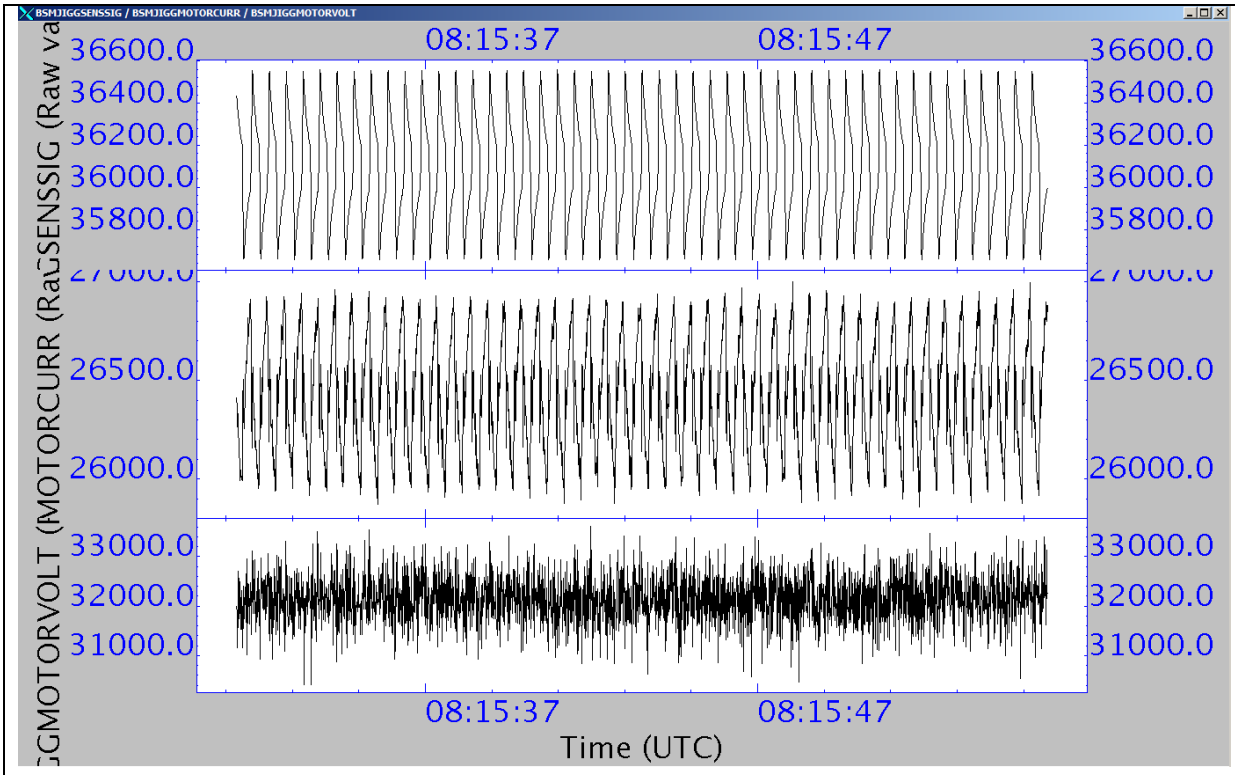
Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-BSM-06-P	CHOPLOOPMODE JIGGLOOPMODE	1/1/1 1/1/1	1/1/1 1/1/1		
	BSMCHOPSENSSIG BSMCHOPMOTORCURR BSMCHOPMOTORVOLT	?/? ?/? ?/?	See plots below	N/A	N/A

Start time @: 08:15
End time @: 08:17
OBSID: 0xb000103f

Comments: Needs better tuning for this chop throw 44423/21113. For tuning during SPT will use 250Hz sampling, rather than 125Hz.





Step#	Action	Comments
4	Execute BSM_OFF	Start Time: 08:19 End Time: 08:20 OBSID: 0xb0001040

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

3.3.16 SPIRE-IST-COLD-FUNC-SMEC-01-P

Test Id:	SPIRE-IST-COLD-FUNC-SMEC-01-P
Test Purpose:	SMEC Switch ON Check. Encoder and LVDT alive check.
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)
Duration	5 Minutes (CUS 40.0)
Success Criteria:	Test passed if : 1. SMECENCPWR HK parameter changes from 0 to 4. 2. SMEC encoder signals 1 and 2 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:

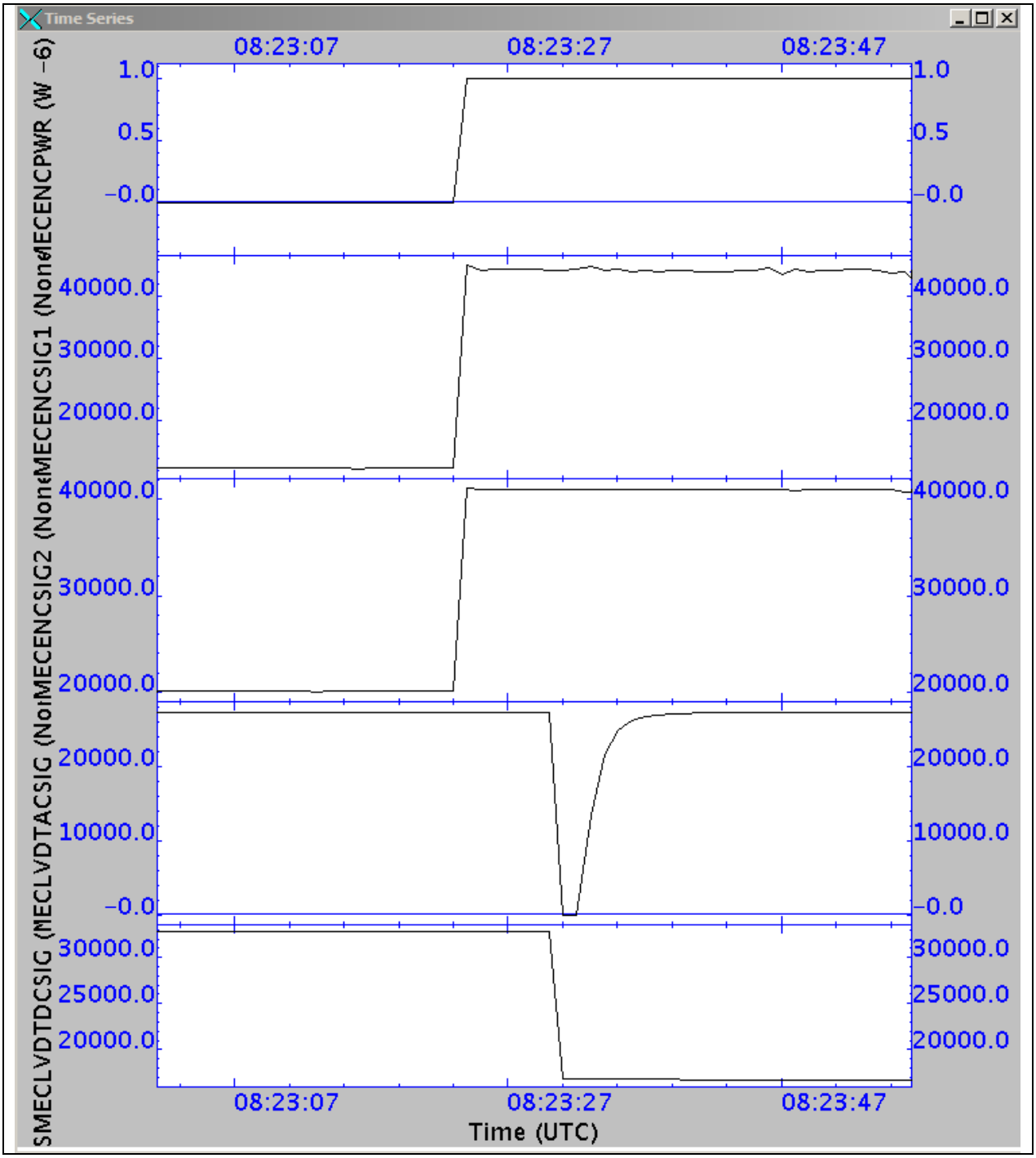
Step#	Action	Comments
1	Run FUNC-SMEC-01.py script on QLA	
2	Run SPIRE-IST-COLD-FUNC-SMEC-01-P test procedure from the CCS.	
3	Contingency: If test fails repeat steps 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-SMEC-01-P	SMECENCPWR SMECLVDTPWR SMECENCSIG1 SMECENCSIG2	0/-/1 0/-/1		N/A	Pass

Start time @: 08:23
End time @: 08:24
OBSID: 0xb0001041

Comments:


Time Series
08:23:07
08:23:27
08:23:47
1.0
0.5
-0.0
40000.0
30000.0
20000.0
40000.0
30000.0
20000.0
20000.0
10000.0
-0.0
30000.0
25000.0
20000.0
SMECLVDTDCSIG (MECLVDTACSIG (NonMECENCSIG2 (NonMECENCSIG1 (NonMECENCPWR (W -6)
Time (UTC)

3.3.17 SPIRE-IST-COLD-FUNC-SMEC-03-P

Test Id:	SPIRE-IST-COLD-FUNC-SMEC-03-P
Test Purpose:	SMEC (PRIME) Encoder Integrity Check.
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)
Duration	5 minutes (CUS 49.0)
Success Criteria:	Test passed if: SMEC encoder signals 1 and 2 show a variation on their amplitudes from one LED illumination level to another. (i.e. MCUENGSMECENCSIG1/2 increase as the encoder power is increased.)

CUS Parameters	frametype = "ENG"; // Specifies MCU frame type [BSM,SMEC,BSM+SMEC,ENG,TEST]
	framerate = 64.0; // Specifies the frame rate
	framenumber = 0xffff; // Frame number
	level_init = 1; //
	level_start = 1;
	level_end = 3;
	level_step = 1;
	led_delay = 5; // Time at each level in seconds

Test Procedure:

Step#	Action
1	**Run FUNC-SMEC-03.py script on QLA**
2	**Run SPIRE-IST-COLD-FUNC-SMEC-03-P test procedure from the CCS.**
3	Contingency: If test fails repeat steps 1 and 2.

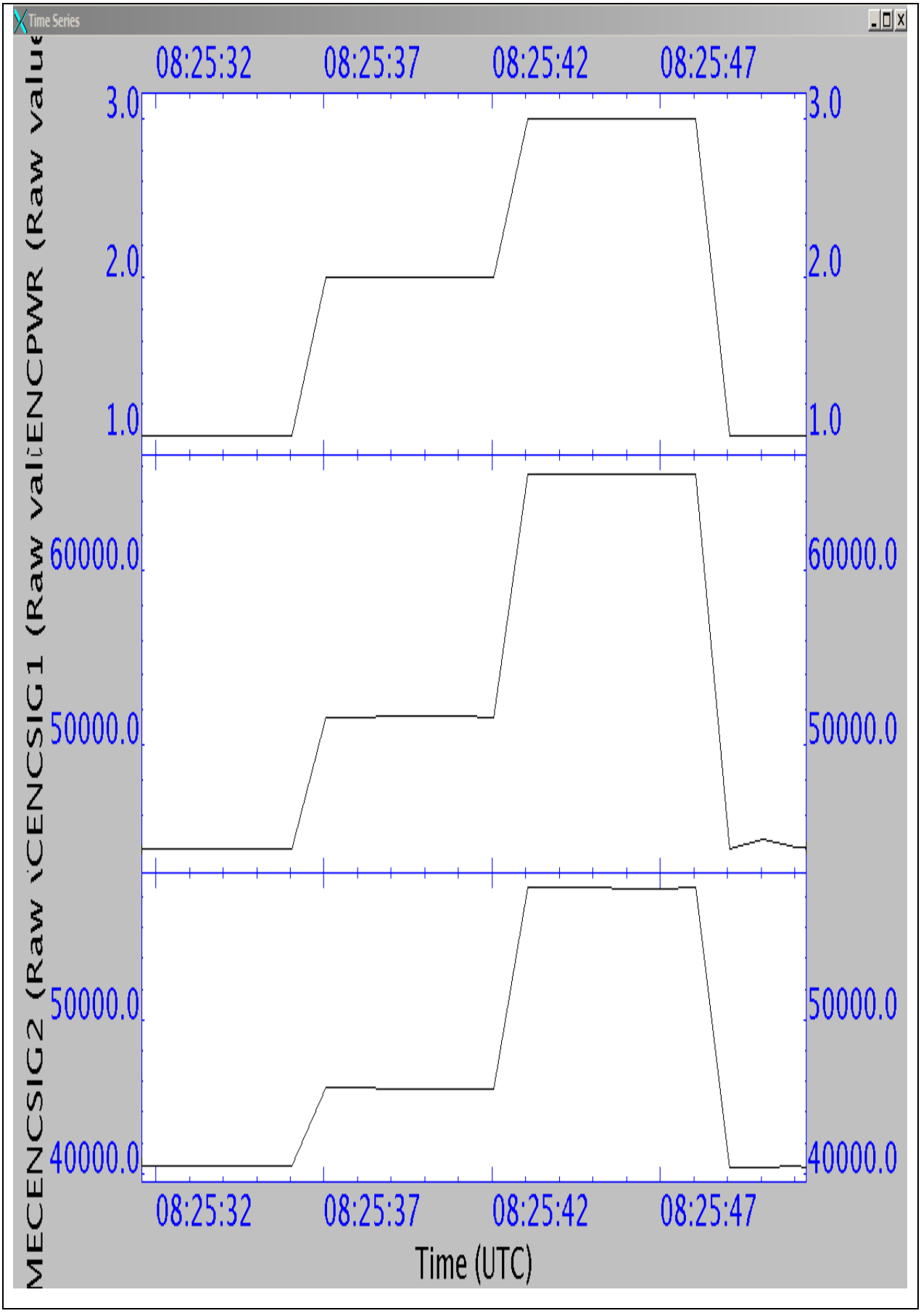
Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-SMEC-03-P	**SMECENCPWR SMECENCSIG1 SMECENCSIG2**		See plots below		**Pass**

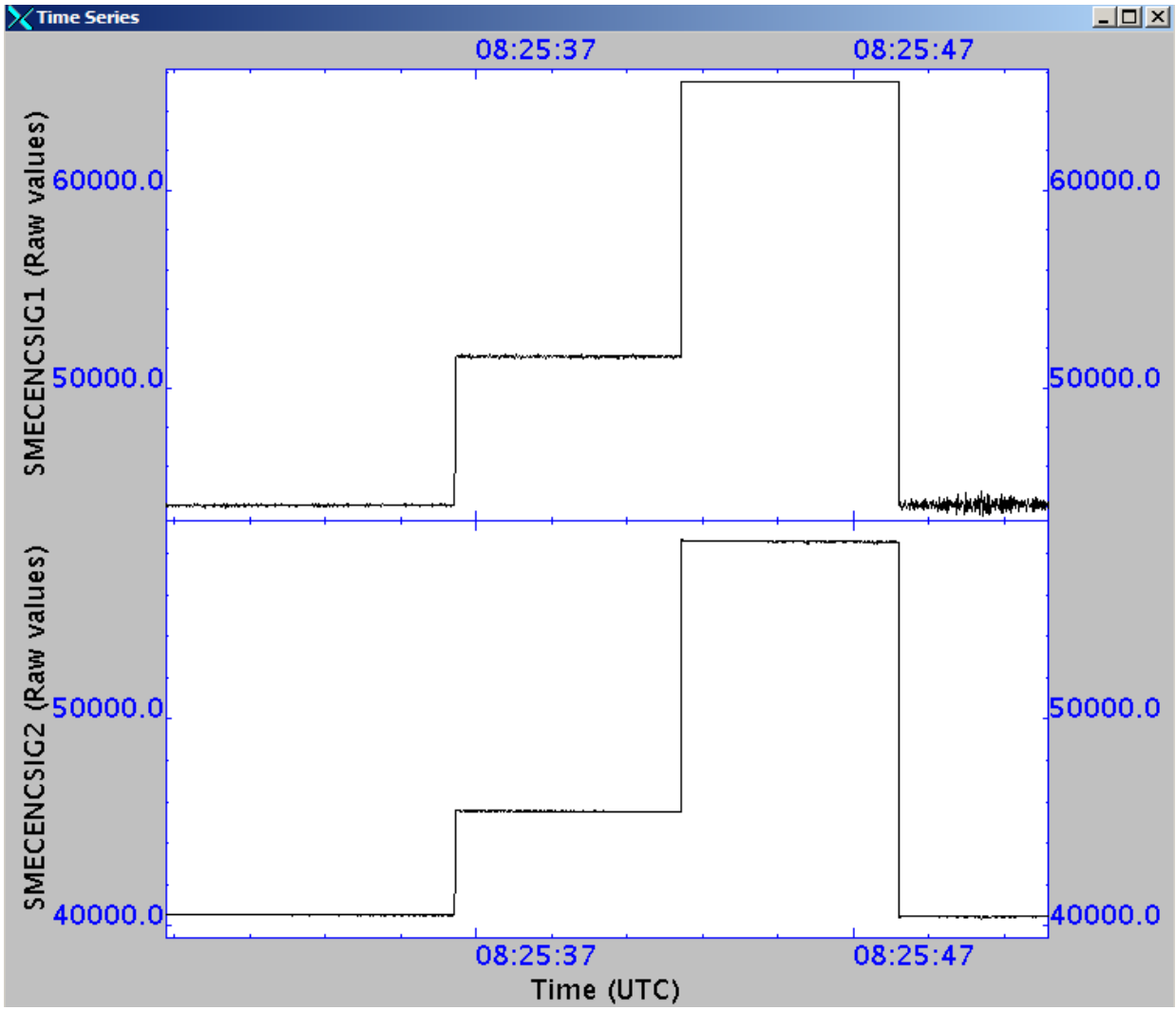
Start time @: 08:25
End time @: 08:26
OBSID: 0xb0001042

Comments: Encoder signal 1 saturated at power level 3. Signal 2 high but OK.

HK plot:


Time Series
08:25:32
08:25:37
08:25:42
08:25:47
3.0
2.0
1.0
60000.0
50000.0
50000.0
40000.0
MECENCSIG2 (Raw vCENCSIG1 (Raw valENCPWR (Raw value
Time (UTC)

MCU Engineering data plot:



3.3.18 SPIRE-IST-COLD-FUNC-SMEC-OFF-P

Test Id:	SPIRE-IST-COLD-FUNC-SMEC-OFF-P
Test Purpose:	SMEC (PRIME) Switch OFF
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 OFF
Duration	3 minutes
Success Criteria:	HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.

Test Procedure:

Step#	Action
1	Run Execute SPIRE-IST-COLD-SMEC-OFF-P.tcl test procedure from the CCS.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-SMEC-OFF-P	SMECENCPWR SMECLVDTPWR	1/-/0 1/-/0	**1/0** **1/0**		**Pass**

Start time @: 08:28
End time @: 08:29
OBSID: 0xb0001042

Comments:

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

3.3.19 SPIRE-IST-COLD-FUNC-DCU-02-P

Test Id:	**SPIRE-IST-COLD-FUNC-DCU-02-P**
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON
Duration	5 Minutes (CUS 140.0)
Success Criteria:	Test passed if DCUFRAMECNT goes from n to n+700 and the frametime difference between consecutive frames computed by QLA script is in agreement with the expected differences based on commanded sampling rate: 1. Photometer Sampling rate is 15.3Hz → Δt ~ 65.5 ms 2. Spectrometer Sampling rate is 80Hz → Δt = 12.5 ms

CUS Parameters	photbiasfreq = 200.0;
	photsampfreq = 15.3;
	specbiasfreq = 160.0;
	specsampfreq = 80.0;
	frames = 100;

Test Procedure:

Step#	Action	Comments
1	Write the current value of DCUFRAMECNT located in DCU PARAMETERS	
2	Run QLA script FUNC-DCU-02.py on QLA console.	
3	Run SPIRE-IST-COLD-FUNC-DCU-02-P test procedure from the CCS.	
4	Write the current value of DCUFRAMECNT	
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
SPIRE-IST-COLD-FUNC-DCU-02-P	DCUFRAMECNT	n/n+700	1600/2300	**700**	Success

Start time @: 08:35
End time @: 08:40
OBSID: 0xb0001044

Comments: OK

Level 3 temperatures:
T246: 10.5K
T247: 11.47K

These temperatures are within the safe JFET switch-on constraints of 10-15K

Test successful but the QLA script did not produce the expected 7 files.
Files QLA-DCU-02_B0001044_8800<n>.txt – where n=0 to 6, should have been produced.
Instead only 5 files were produced, viz. QLA-DCU-02_B0001044_880<2/3/5/6>.txt and QLA-DCU-02_B0001044_8000.txt.

Contents of QLA created files show sampling times to be consistent with input parameters entered for sampling frequencies of photometer ~15.3Hz ($\Delta t \sim 65.5$ ms) **and spectrometer 80Hz** $\Delta t \sim 12.5$ ms**.**

3.3.20 SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P

Test Id:	SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P
Test Purpose:	Photometer BDAs Switch ON Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Duration	7 minutes (CUS 122.0)
Success Criteria:	Test passed if Photometer JFET source and drain voltages are correct: 1. PSWJFETVSS1/2/3/4/5/6 (values according to latest Vss). 2. PMLWJFETVSS1/2/3/4 (values according to latest Vss). 3. PSWJFETSTAT = 0x3F 4. PMLWJFETSTAT = 0x**7**F

CUS Parameters	heater_V = 0; // Specifies if the heater is to be switched ON or not
	array = "PF"; //default array to switch ON

Test Procedure:

Step#	Action
1	Run SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P test procedure from the CCS. with default input parameters
2	After the test, write down the values RAW and converted values of: PSWJFETSTAT, PMLWJFETSTAT, PSWJFET1/2/3/4/5/6V PMWJFET1/2/3/4V PLWJFET1/2V located in the DCU PARAMETERS display
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	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-11-PHOT-P	**PSWJFETSTAT** **PMLWJFETSTAT** **PLIABITSTAT** **PLIAP5V** **PLIAP9V** **PLIAM9V**	**0/0x3f** **0/0x7f** **1** **~0/ ~+5.17 ± 0.1V** **~0/ ~+11.53 ± 0.1V** **~0/ ~-11.53 ± 0.1V**	**OK** **OK** **1** **5.23V** **11.58V** **-11.58V**	**N/A**	**Pass**

Start time @: 08:40
End time @: 08:43
OBSID: 0xb0001045

Comments:
All the photometer JFETs switched on OK

QLA script output:

```
DCU-11-phot
Start time @: 07-Mar 08:39:58
End time @: 07-Mar 08:41:44
OBSID: 0xB0001045

PLIABITSTAT:
Start value: 0x0
End value: 0x4C

                  Before/After
PSWJFETSTAT      0x0/0x3F
PMLWJFETSTAT     0x0/0x7F

PSWJFET1V        -0.00/-1.47 V
PSWJFET2V        -0.00/-1.47 V
PSWJFET3V        -0.00/-1.47 V
PSWJFET4V        -0.00/-1.47 V
PSWJFET5V        -0.00/-1.47 V
PSWJFET6V        -0.00/-1.47 V

PMWJFET1V        -0.00/-1.47 V
PMWJFET2V        -0.00/-1.47 V
PMWJFET3V        -0.00/-1.47 V
PMWJFET4V        -0.00/-1.47 V

PLWJFET1V        -0.00/-1.47 V
PLWJFET2V        -0.00/-1.47 V

TCJFETV          0.00/-1.47 V
```

Plots to be attached.

3.3.21 SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P

Test Id:	SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P
Test Purpose:	Photometer Detectors Integrity Check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON+ Photometer LIAs ON + Photometer BIAS ON +Photometer JFETs ON
Duration	15 minutes (CUS 726)
Success Criteria:	Test passed if : The photometer detectors show a small linear variation on the output voltage when different bias is applied through the load curve.

CUS Parameters	dcumode = "PF"; // Specifies array in which to perform LC
	mclkdiv = 0x95; // Master clock divisor ,which specifies bias freq
	biasdiv = 0x6; // Sampling divisor ,which specifies sampling rate
	psw_phase = 0x80; // PSW demod phase
	pmw_phase = 0x80; // PMW demod phase
	plw_phase = 0x80; // PLW demod phase
	ftime = 10; // Time at each bias level

Test Procedure:

Step#	Action
1	Run FUNC-DCU-13P.py script on QLA
2	Run SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P test procedure from the CCS. With default input parameters
3	Contingency: If test fails repeat step 1 and 2.

Test Log:

Test Id	Key Parameter(s)	Expected Value Before	Actual Value Before/After	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-13-PHOT-P	**PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT**	**1/1 0x3F/0x3F 0x7F/0x7F**	1/1 0x3F/0x3F 0x7F/0x7F		**Pass**

OBSID: 0xb0001046
Start: 09:04
End: 09:14

Comments:

PSW-D15 Load Curve is reversed again. Was OK after the harness repair (see WFT report following harness repair RD08)

PMW-B9 is still reversed because the harness repair was not carried out (see RD08 and RD09)

3.3.22 SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P

Test Id:	SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Duration	5 minutes
Success Criteria:	Test passed if : The Photometer detectors do not show excess noise.

Test Procedure:

Step#	Action	Comments
1	**Run SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P test procedure from the CCS.**	
2	Contingency: If test fails repeat step 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-14-PHOT-P	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1/1 0x3F/0x3F 0x7F/0x7F	1/1 0x3F/0x3F 0x7F/0x7F		**Pass**

Start time @: 09:38
End time @: 09:40
OBSID: 0xb0001047

Comments:

Detectors settings:

Bias frequency: 130 Hz
Sampling frequency: 18 Hz
PSW phase: 180.71 deg
PMW phase: 180.71 deg
PLW phase: 180.71 deg
PSW bias : ~ 31mV
PMW bias : ~ 31mV
PLW bias : ~ 31mV
TC bias : ~ 62 mV

Duration of test: 2 minutes

3.3.23 SPIRE-IST-COLD-PHOT-VSS-P

Test Id:	SPIRE-IST-COLD-PHOT-VSS-P
Purpose:	Photometer BDAs Vss Test PRIME
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer LIAs ON + Photometer BIAS ON + Photometer JFETs ON
Duration	20 minutes
Success Criteria:	Test passed if the Photometer detectors do not show excess noise.

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Check that Photometer LIAs and detectors are switched on	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1/1 0x3F/0x3F 0x7F/0x7F		
2	Execute TCL script SPIRE-IST-COLD -PHOT-VSS-P.tcl	—	—	—	
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	—	
Test Result (Pass/Fail):					

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
SPIRE-IST-PHOT-VSS-P	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1/1 0x3F/0x3F 0x7F/0x7F	1/1 0x3F/0x3F 0x7F/0x7F		**Pass**

Start time @: 09:45
End time @: 10:05
OBSID: 0xb0001048

Comments:

Script executed successfully but CCS report seeing problems with the Set Dummy part of the script.

Noise is close to minimum at Vss ~ -1.5V (TBC)

3.3.24 SPIRE-IST-COLD-PDET-OFF-P

Test Id:	SPIRE-IST-COLD-PDET-OFF-P
Test Purpose:	Photometer BDAs Switch OFF
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer BDAs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Photometer BDAs OFF
Duration	3 minutes
Success Criteria:	Test passed if SCUDCDCSTAT goes from 4 to 6, Spectrometer LIAs voltages are correct and SJFET voltages are also correct.

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-PDET-OFF-P.tcl	—	—	—	
2	Check that the Photometer detectors are switched off	PSWJFETSTAT PMLWJFETSTAT	0x3F/-/0 0x7F/-/0		
3	Check that the Photometer LIAs are switched off	PLIABITSTAT	1/-/0		
4	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	—	
Test Result (Pass/Fail):					

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
SPIRE-IST-PDET-OFF-P	PLIABITSTAT PSWJFETSTAT PMLWJFETSTAT	1/0 0x3F/0 0x7F/0	1/0 0x3F/0 0x7F/0	N/A	Pass

Start time @: 10:21
End time @: 10:23
OBSID: 0xb0001049

Comments:

3.3.25 SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P

Test Id:	SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P
Test Purpose:	Spectrometer BDAs switch ON check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Duration	7 minutes
Success Criteria:	Test passed if SCUDCDCSTAT goes from 4 to 6, Spectrometer LIAs voltages are correct and SJFET voltages are also correct.

CUS Parameters	heater_V = 0; //Specifies if the heater is to be switched ON
	array = "SF"; //default array to swicth ON

Test Procedure:

Step#	Action
1	**Run SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P test procedure from the CCS.**
2	**After the test Write down the values RAW and converted values of:** LIASTAT SLIAP5V, SLIAP9V, SLIAM9V SSWJFETSTAT,SLWJFETSTAT SSWJFET1V,SLWJFET2V located in on the DCU PARAMETERS display.
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	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-11-SPEC-P	**SPECJFETSTAT** **SSWJFET1V** **SSWJFET2V** **SLWJFET1V** **SLIABITSTAT** **SLIAP5V** **SLIAP9V** **SLIAM9V**	**0/7** **0V/-1.5V** **0V/-1.5V** **0V/-1.5V** **1** **~0/ ~+5.23 ± 0.1V** **~0/ ~+11.57 ± 0.1V** **~0/ ~-11.54 ± 0.1V**	**0 / 7** **0 / -1.47V** **0 / -1.47V** **0 / -1.47V** **5.25V** **11.59V** **-11.56V**	**N/A**	**Pass**

Start time @: 10:28
End time @: 10:30
OBSID: 0xb000104a

Comments: S-LIA temperatures ~300K

QLA output:

```
DCU-11-spec
Start time @: 07-Mar 10:28:48
End time @: 07-Mar 10:30:26
OBSID: 0xB000104A
```

```
SLIABITSTAT:
Start value: 0x0
End value: 0x1

                  Before/After
SCUDCDCSTAT      0x4/0x6
LIASTAT          0x0/0x0
SLIAP5V          0.11/5.25 V
SLIAP9V          0.02/11.59 V
SLIAM9V          0.02/-11.56 V
SPECJFETSTAT     0x0/0x7
SSWJFET1V        -0.00/-1.47 V
SSWJFET2V        -0.00/-1.47 V
SLWJFET1V        -0.00/-1.47 V
```

SSW JFETs 1 and 2 don't appear to have switched on.

Deviation from standard CFT sequence

Switch off and try switching on again:

1) SPIRE-IST-COLD-SDET-OFF
Start time @: 10:47
End time @: 10:48
OBSID: 0xb000104b

T246 = 10.66K
T247 = 11.92K

2) SPIRE-IST-COLD-FUNC-11-SPEC-P
Start time @: 10:53
End time @: 10:55
OBSID: 0xb000104c

SSW JFETs 1 and 2 don't appear to have switched on.
NCR HP-112000-ASED-NC-3996 raised.

3) Now try the Spectrometer Vss test out of sequence:

SPIRE-IST-COLD-SPEC-VSS-P
Start time @: 11:11
End time @: 11:26
OBSID: 0xb000104d

SSW and SLW biases set to non-nominal values of ~1.38mV

Noise on the channels on JFETs 1 &2 is changing with each Vss step.

JFETs 1 & 2 switched on at -2.4V.

Use JFET 1 & 2 Vss values -2.6V for next switch-on.

Manual commands sent from the CCS to start DCU data generation in order to ensure

that the JFETs are still on.

0x843e0001

JFETs look OK

11:48
0x843e0000
FLUSH_FIFO(0x1000)

3.3.26 SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P

Test Id:	SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P
Test Purpose:	Spectrometer detectors check
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	Unchanged
Duration	12 minutes
Success Criteria:	The spectrometer detectors show a small linear variation on the output voltage when different bias is applied through the load curve.

CUS Parameters	dcumode = "SF"; //DCU data mode
	mclkdiv = 0x79; //Master clock divisor
	biasdiv = 0x1; // Bias divisor
	ssw_phase = 0x80; // SSW demod phase
	slw_phase = 0x80; // SLW demod phase
	ftime = 10; // Time at each bias level

Test Procedure:

Step#	Action	Comments
1	On QLA bring up a time series display of a couple of pixels on each of the spectrometer BDAs	
2	Run SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P test procedure from the CCS.	
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	No. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-13-SPEC-P	SPECJFETSTAT SLIABITSTAT	7 1	7 1	N/A	Pass

Start time @: 11:55
End time @: 12:08
OBSID: 0xb000104e

Load Curve plots look OK.
These plots not included in report as the test will be repeated later – see deviation from standard CFT sequence in section 3.3.29.

3.3.27 SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P

Test Id:	
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Duration	5 minutes (CUS 146.0)
Success Criteria:	The Spectrometer detectors don't show excess noise.

CUS Parameters	dcumode = "SF"; //Array on which phase peak up is to be done
	ftime = 120; //time at each phase

Test Procedure:

Step#	Action	Comments
1	**Run SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P test procedure from the CCS.**	
2	Contingency: If test fails repeat step 1.	

Test Log:

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P	SPECJFETSTAT SLIABITSTAT	7 1		N/A	

Start time @: 12:09
End time @: 12:11
OBSID: 0xb000104f

Comments:

Detectors settings:
Bias frequency: 160.09 Hz
Sampling frequency: 80.04 Hz
SSW phase: 180.71 deg
SLW phase: 180.71 deg
SSW bias : ~ 31mV
SLW bias : ~ 31mV
Duration of test: 2 minutes

3.3.28 SPIRE-IST-COLD- SPEC-VSS-P

Test Id:	
Purpose	Spectrometer BDAs Vss Test PRIME
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	Unchanged
Duration	20 minutes (CUS 906.0)
Success Criteria:	Spectrometer BDA Vss values are optimised

CUS Parameters	jfet_Vss_start = -1.4; //Starting JFET source voltage
	jfet_Vss_end = -2.6; //ending JFET source voltage
	jfet_Vss_step = -0.2; //steping JFET source volatge
	ftime = 120; //wait time at each level;

Procedure Steps:

Step	**Description**	**Parameter - Unit**	**Expected Values Before/ During/ After**	**Actual Values Before/ During/ After**	**Success/ Failure**
1	Check that the Spectrometer detectors and LIAs are switched on	SPECJFETSTAT SLIABITSTAT	7 1		
2	Execute TCL script SPIRE-IST-COLD- SPEC-VSS-P.tcl	—	—	—	
3	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	—	
Test Result (Pass/Fail):					

Test Id	**Key Parameter(s)**	**Expected Value Before/After**	**Actual Value Before/After**	**Nb. of frames received**	**Test Result**
SPIRE-IST-COLD-FUNC-DCU-14-SPEC-P	**SPECJFETSTAT SLIABITSTAT**	**7 1**	**7 1**	**N/A**	

Start time @: 12:12
End time @: 12:28
OBSID: 0xb0001050

Comments:

Detectors settings:
Bias frequency: 160.09 Hz
Sampling frequency: 80.04 Hz
SSW phase: 180.71 deg
SLW phase: 180.71 deg
SSW bias : ~ 31mV
SLW bias : ~ 31mV

3.3.29 SPIRE-IST-COLD-SDET-OFF-P

Test Id:	SPIRE-IST-COLD-SDET-OFF-P
Purpose	Spectrometer BDAs Switch OFF
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer LIAs ON + Spectrometer BIAS ON + Spectrometer JFETs ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU ON + Spectrometer BDAS OFF
Duration	3 minutes
Success Criteria:	DCU HK parameters show expected values

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-SDET-OFF-P.tcl	—	—		
2	Check that the Spectrometer detectors are switched off	SPECJFETSTAT	7/-/0		
3	Check that the Spectrometer LIAs are switched off	SLIABITSTAT	1/-/0		
4	**Wait for the I-EGSE staff to confirm the success or failure of this test**	—	—	—	
Test Result (Pass/Fail):					

Test Id	Key Parameter(s)	Expected Value Before/After	Actual Value Before/After	Nb. of frames received	Test Result
SPIRE-IST-COLD-SDET-OFF-P	**SPECJFETSTAT** **SLIABITSTAT**	**7** **1**		**N/A**	

Start time @: 13:04
End time @: 13:05
OBSID: 0xb0001051

Comments:

Deviation from standard CFT sequence

Updated SSWNominalSettings.txt Cal Table to increase SSW Vss settings to -2.6V.
Committed to registry
Stopped CCS Handler

Changed mission config to fm_ist_cft_config2 after increasing the SSW Vss settings to -2.6V.
Restarted CCS Handler.

SPIRE-IST-COLD-FUNC-11-SPEC-P
Start time @: 13:23
End time @: 13:25
OBSID: 0xb0001055

SPIRE-IST-COLD-FUNC-13-SPEC-P
Start time @: 13:29
End time @: 13:25
OBSID: 0xb0001056

See Annexe 2 for Load Curve plots.

SPIRE-IST-COLD-SDET-OFF-P
Start time @: 13:42
End time @: 13:43
OBSID: 0xb0001057

3.3.30 SPIRE-IST-COLD-MCU-OFF-P

Test Id:	SPIRE-IST-COLD-MCU-OFF-P
Purpose	MCU Prime Switch OFF
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU Prime ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry ON+MCU Prime OFF
Duration	5 minutes
Success Criteria:	MCU HK parameters show expected values

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-IST-COLD-MCU-OFF-P.tcl	—	—	—	**OBSID: 0xb0001058 13:44**
2	Check that the MCU is switched off	MCUBITSTAT	1/-/0		
Test Result (Pass/Fail):					

3.3.31 SPIRE-IST-COLD-SCU-OFF-P

Test Id:	SPIRE-IST-COLD-SCU-OFF-P
Purpose	SCU Prime Switch OFF
Initial Configuration:	**DRCU_ON** + AC/DC thermometry ON
Final Configuration:	**DRCU_ON** + AC/DC thermometry OFF
Duration	5 minutes
Success Criteria:	SCU HK parameters show expected values

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-IST-COLD-SCU-OFF-P.tcl	—	—	—	**OBSID: 0xb0001058 13:45**
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0xFFFF/-/0		
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0		
Test Result (Pass/Fail):					

3.3.32 SPIRE-IST-COLD-DRCU-OFF-P

Test Id:	**SPIRE-IST-COLD-SCU-OFF-P**
Purpose	DRCU PRIME Switch OFF
Initial Configuration:	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON.
Final Configuration:	SPIRE DPU PRIME is ON, SPIRE DRCU PRIME is OFF and SPIRE HK is not being produced.
Duration	5 minutes
Success Criteria:	THSK and TM2N stop refreshing/incrementing

Procedure Steps:

Step	**Description**	**Parameter - Unit**	**Expected Values Before/ During/ After**	**Actual Values Before/ During/ After**	**Success/ Failure**
1	Execute TCL script SPIRE-IST-COLD-DRCU-OFF.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	THSK	Not refreshing	—	
3	Check that TM2N parameter is not incrementing anymore	TM2N	Not incrementing	—	
4	**Power OFF the SPIRE DRCU PRIME unit.**	—	—	—	
Test Result (Pass/Fail):					

3.3.33 SPIRE-IST-COLD-DPU-OFF-P

Test Id:	SPIRE-IST-COLD-DPU-OFF-P
Purpose	DPU PRIME Switch OFF
Initial Configuration:	SPIRE DPU PRIME is ON but not generating HK.
Final Configuration:	SPIRE DPU PRIME is OFF.
Duration	5 minutes
Success Criteria:	Power to SPIRE DPU PRIME is OFF

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	**Power OFF the SPIRE DPU PRIME unit.**	—	—	—	
Test Result (Pass/Fail):					

4. END TEST SEQUENCE

4.1 NORMAL END TEST SEQUENCE

The following table shows the steps performed to end the functional test sequence.

Step#	Action	HK parameters	Expected Value	Comments	Check
1	Check BSM is OFF	CHOPSENSPWR JIGGSENSPWR	0 0	0 0	✓ ✓
2	Check SMEC is OFF	SMECENCPWR	0	0	✓

Final instrument configuration is REDY.

5. ANNEXE 1 (RESULTS OF LOAD CURVES)

The following graphs (1-12) show the response of the 288 Photometer detectors to the input voltage during the Load Curve (FUNC-DCU-13). The graph (13) shows the response of the 3 PTC channels to the input voltage during the Load Curve. The graphs (14-16) show the spectrometer 78 detectors output voltage during the load curve performed on the spectrometer side. These plots are for OBSIDs 0xB0001046 for photometer and 0xB0001056 for spectrometer.

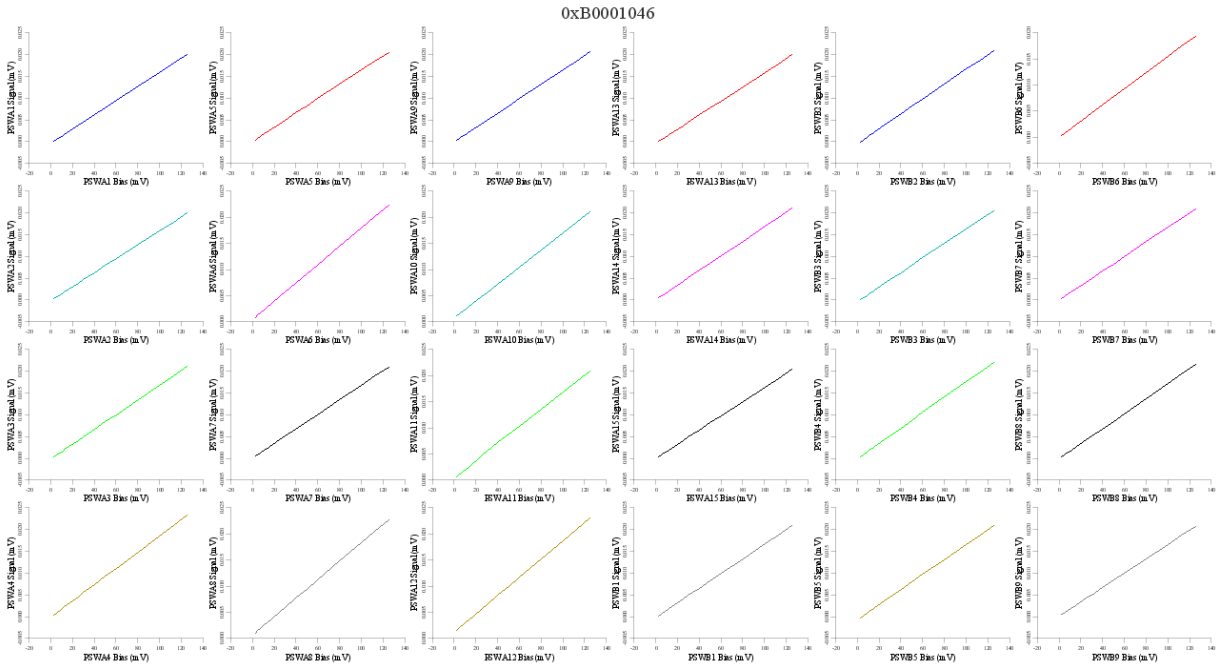


Figure 1. PSW Detectors (1)

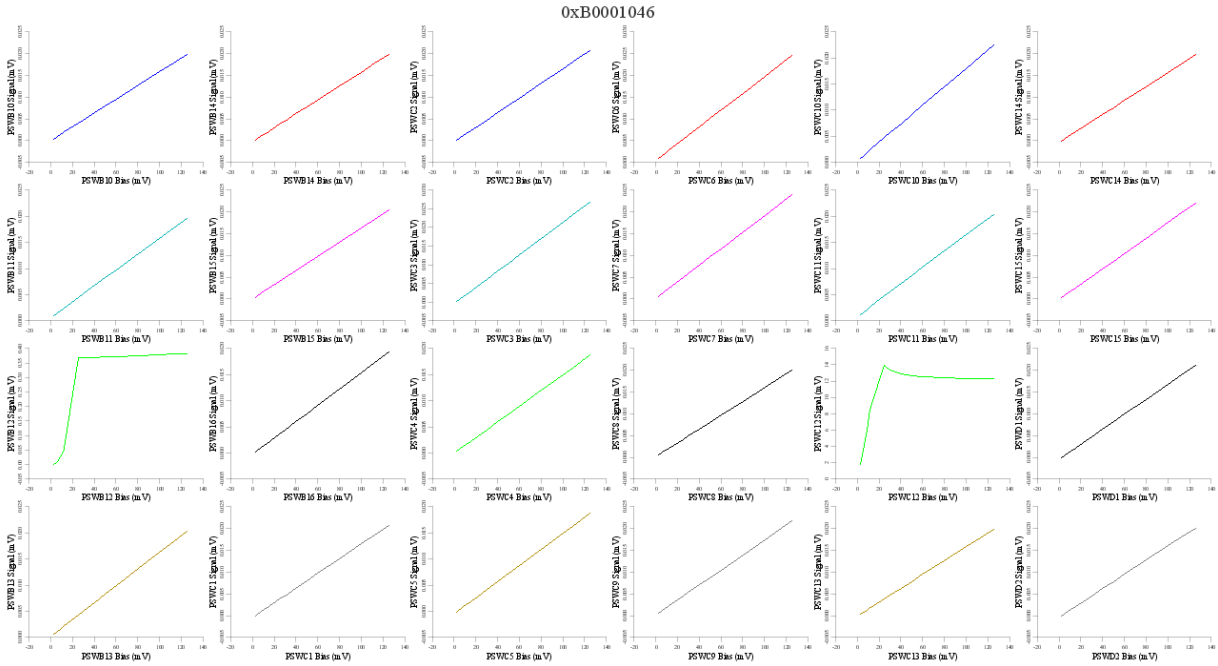


Figure 2. PSW Detectors (2)

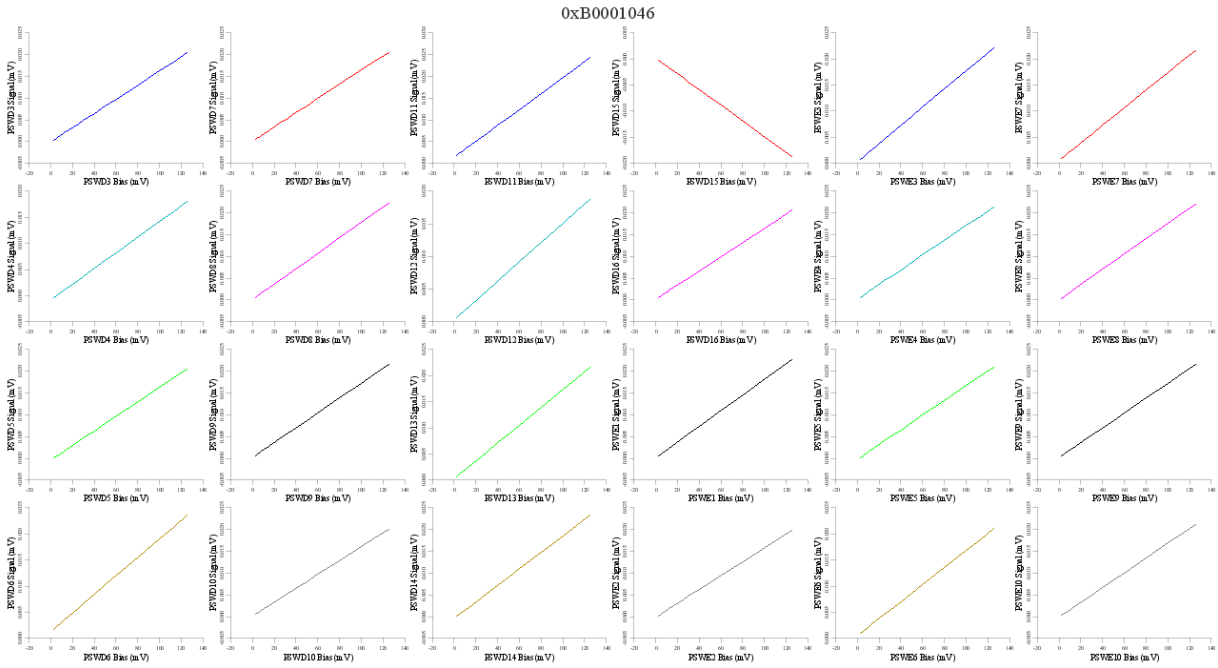


Figure 3. PSW Detectors (3)

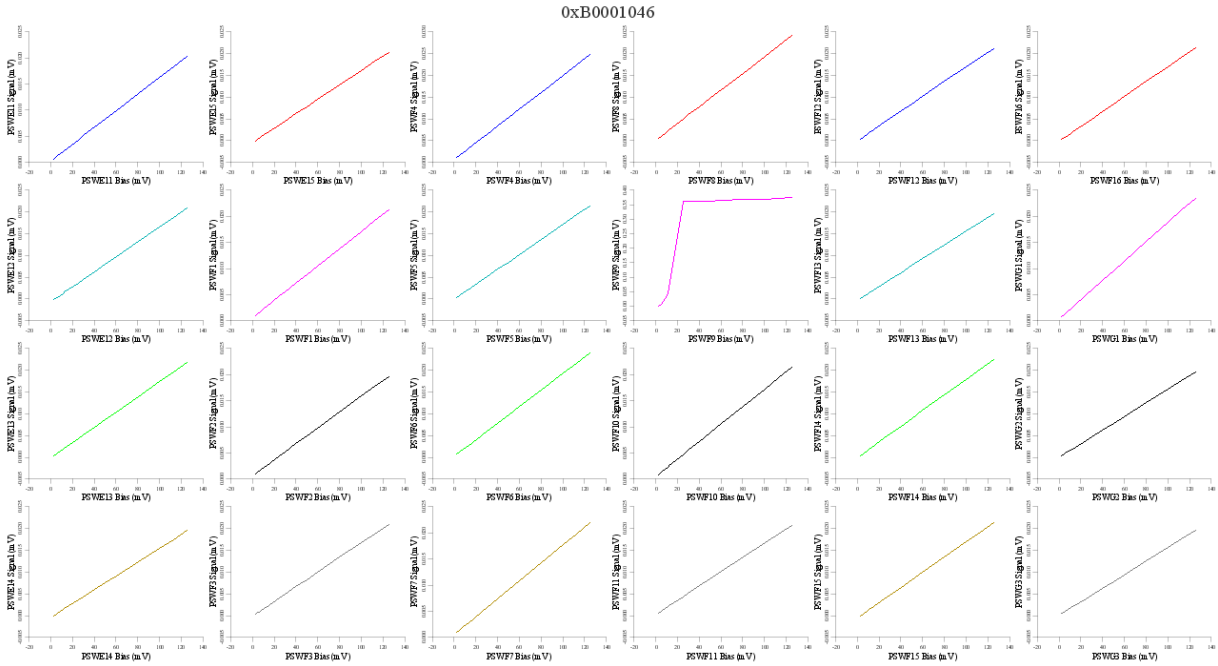


Figure 4. PSW Detectors (4)

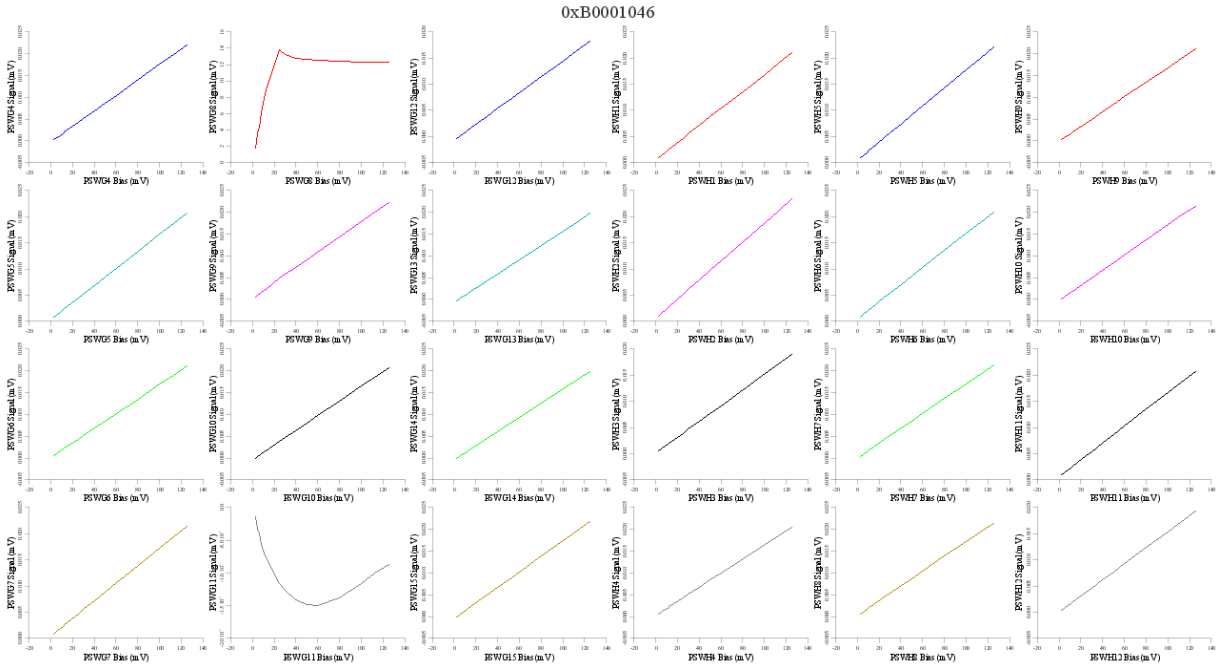


Figure 5. PSW Detectors (5)

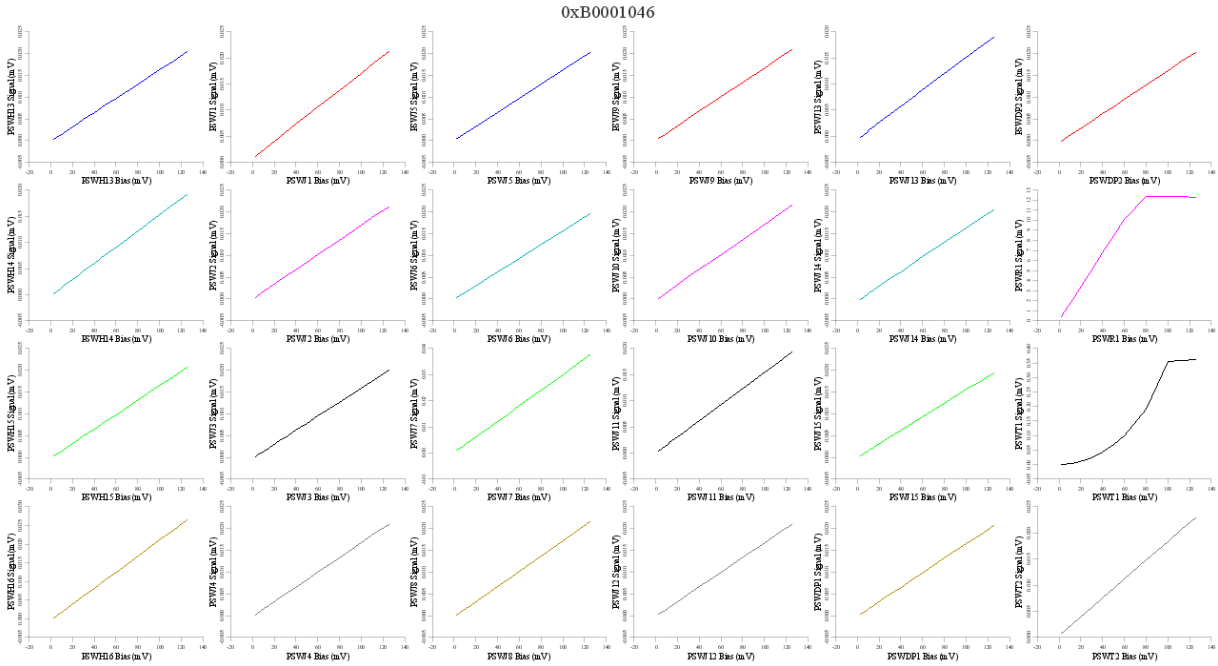


Figure 6. PSW Detectors (6)

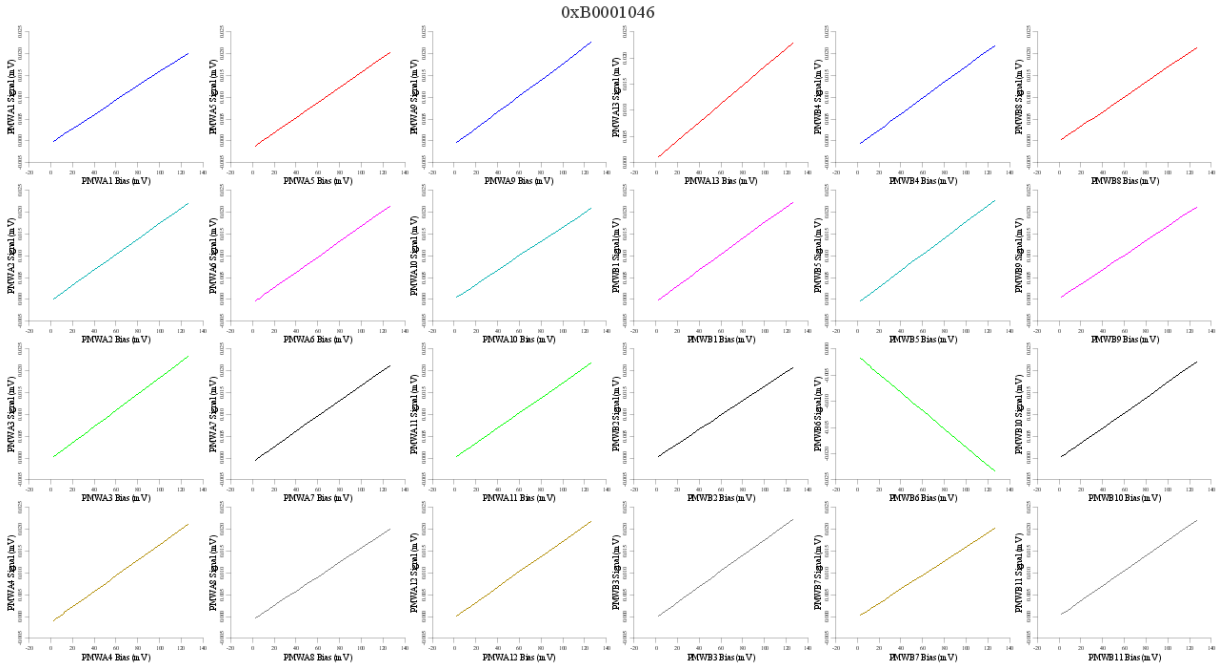


Figure 7. PMW Detectors (1)

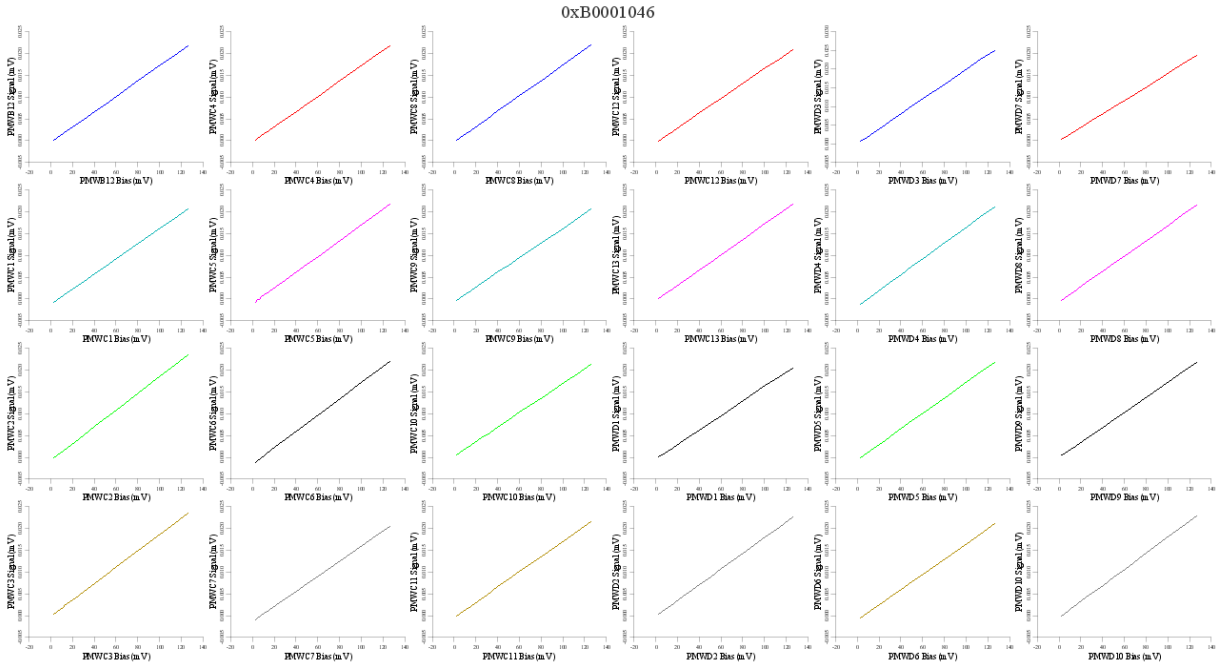


Figure 8. PMW Detectors (2)

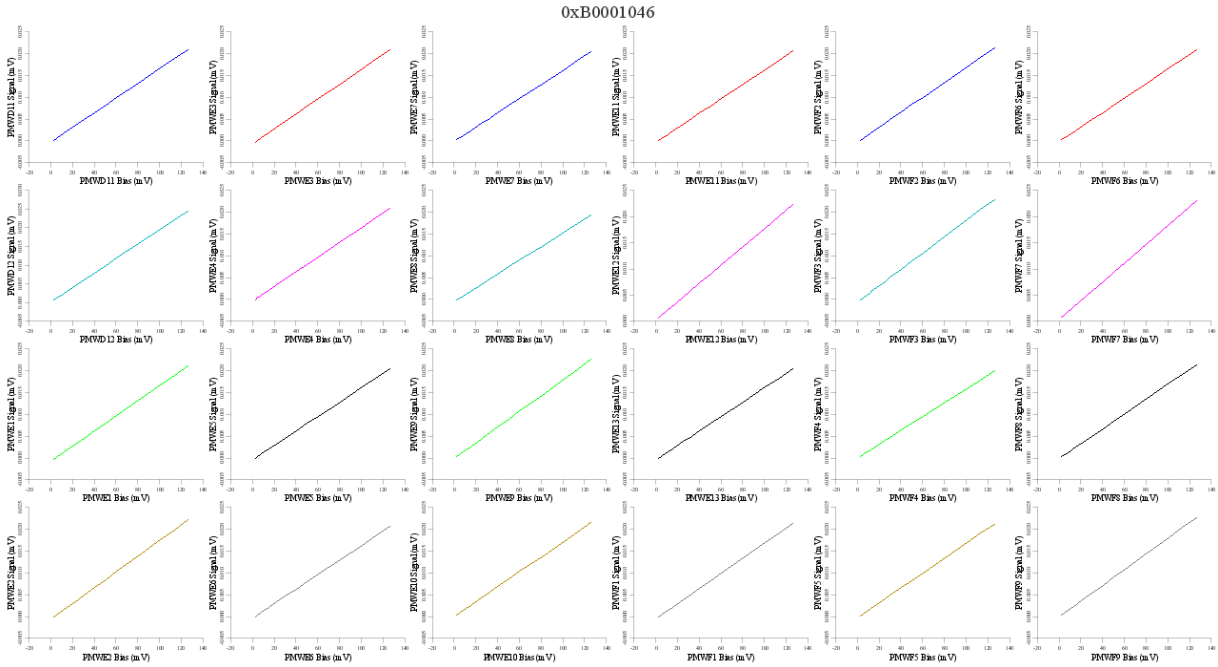


Figure 9. PMW Detectors (3)

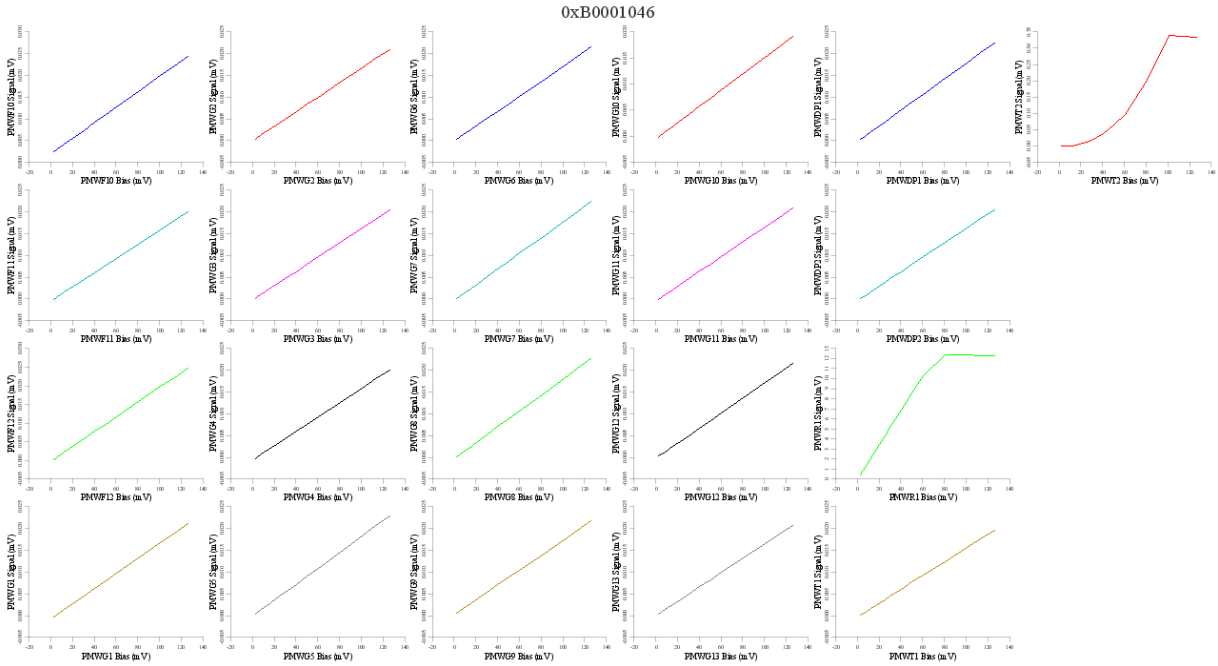


Figure 10. PMW Detectors (4)

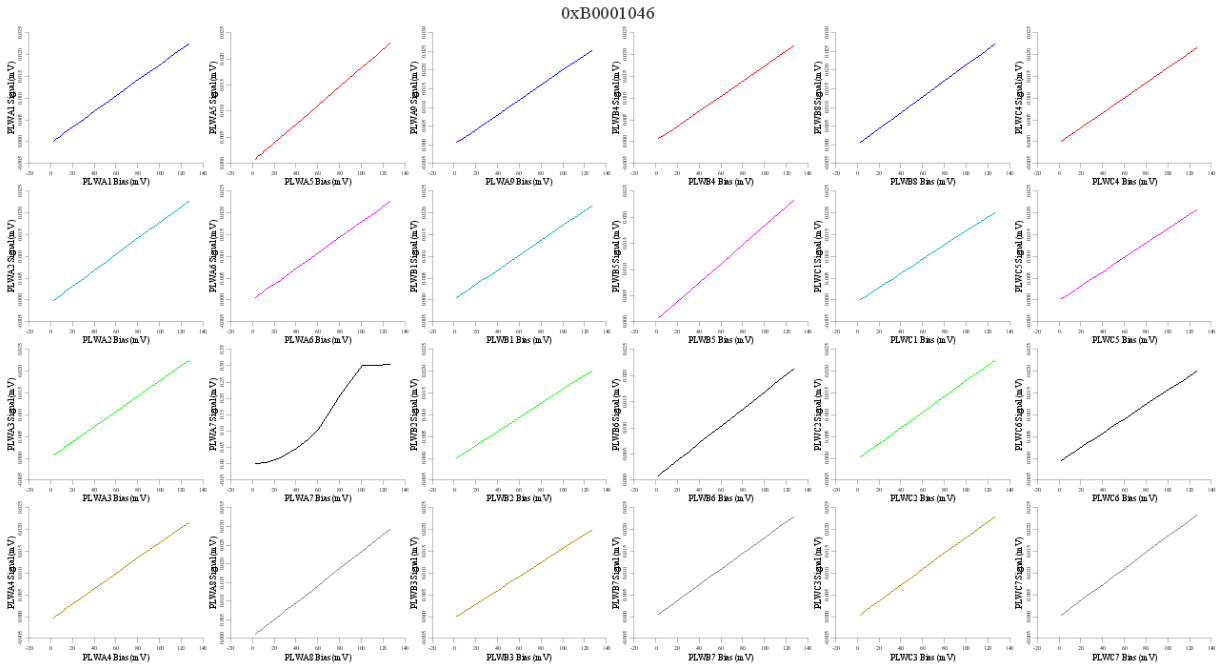


Figure 11. PLW Detectors (1)

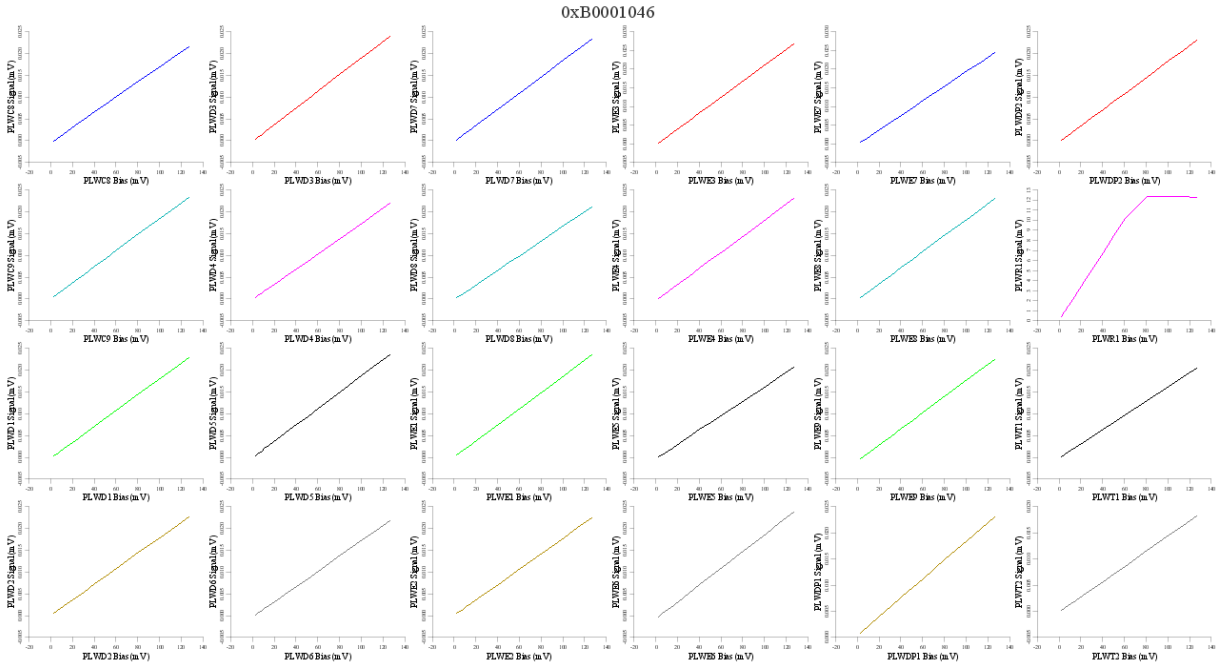
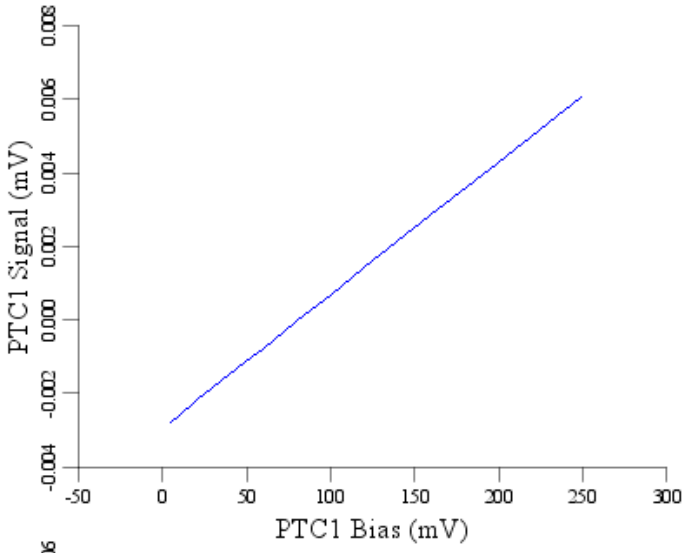
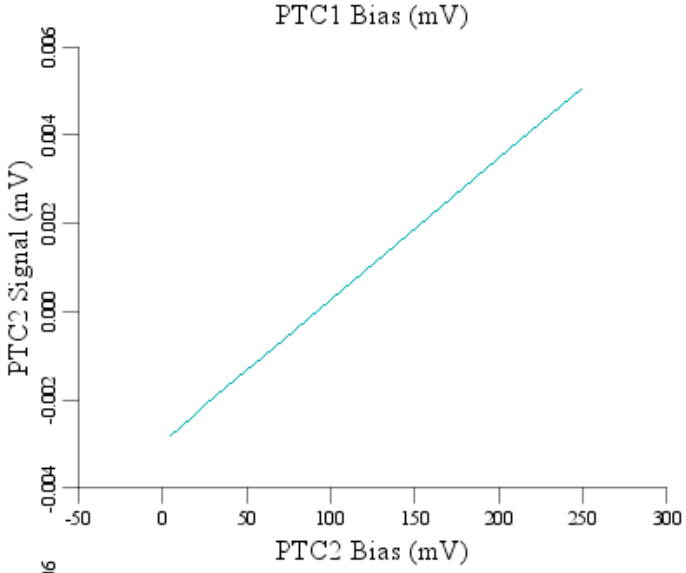


Figure 12. PLW Detectors (2)

0xB0001046


PTC1 Signal (mV)
0.008
0.006
0.004
0.002
0.000
-0.002
-0.004
-50
0
50
100
150
200
250
300
PTC1 Bias (mV)


PTC2 Signal (mV)
0.006
0.004
0.002
0.000
-0.002
-0.004
-50
0
50
100
150
200
250
300
PTC2 Bias (mV)

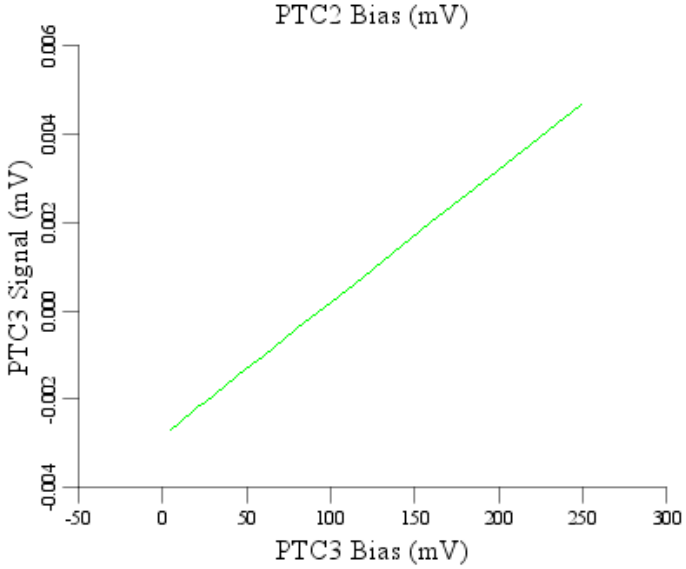

PTC3 Signal (mV)
0.006
0.004
0.002
0.000
-0.002
-0.004
-50
0
50
100
150
200
250
300
PTC3 Bias (mV)

Figure 13. PTC Detectors (1)

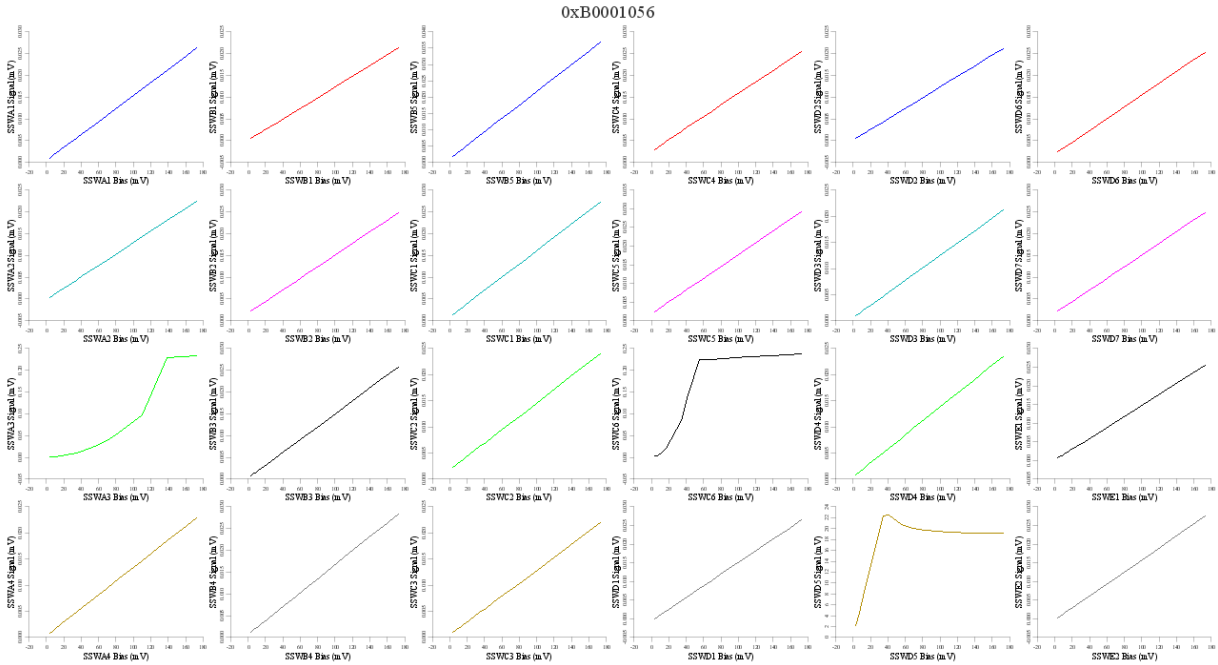


Figure 14. SSW Detectors (1)

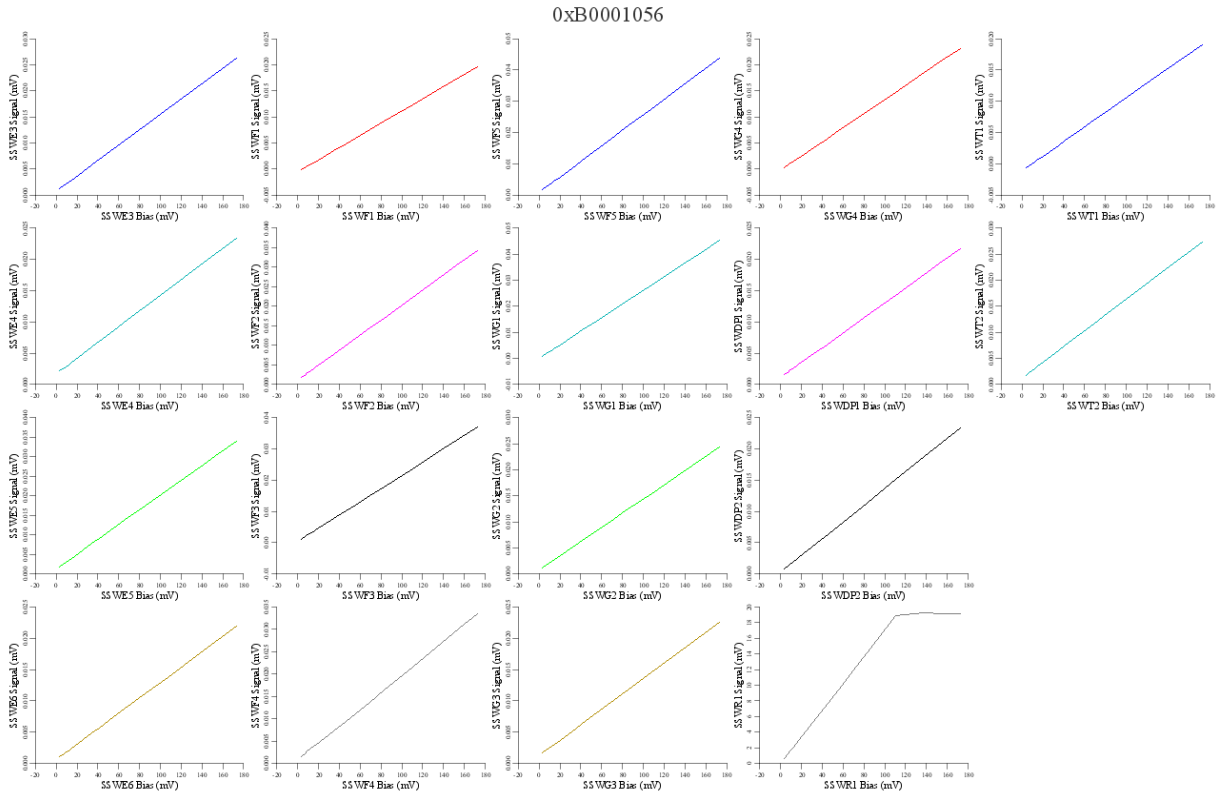


Figure 135. SSW Detectors (2)

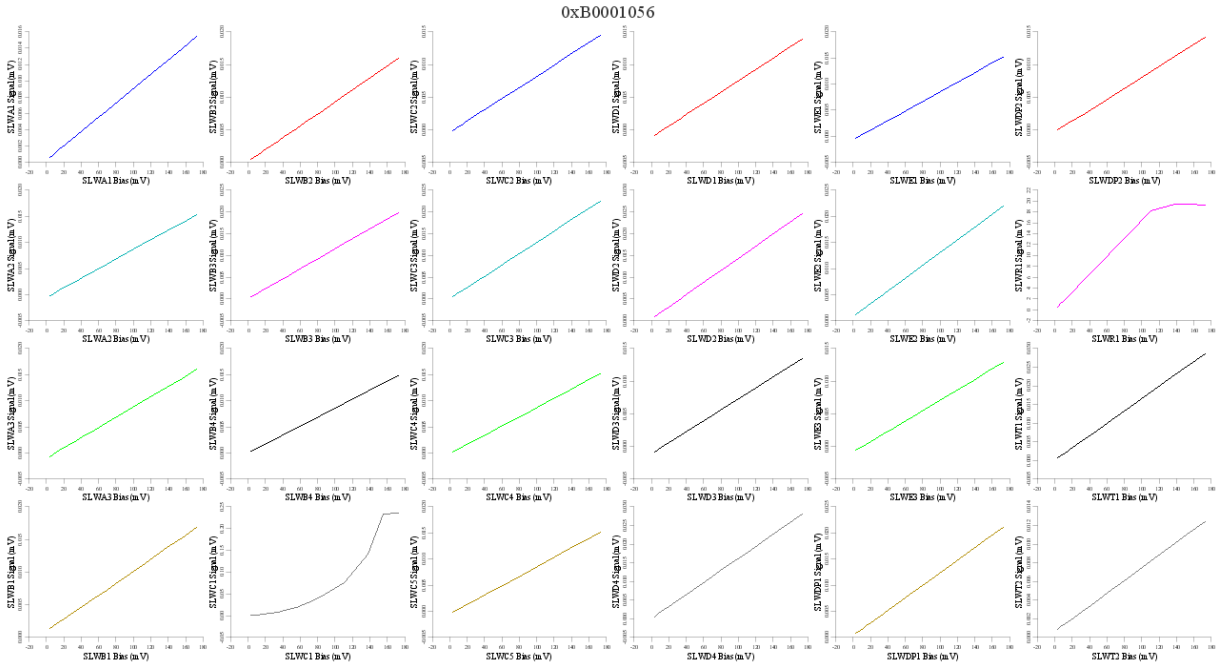


Figure 146. SLW Detectors (1)

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	Name	Dep./Comp.		Name	Dep./Comp.
X	Alberti von Mathias Dr.	ASG22		Schweickert Gunn	ASG22
	Baldock Richard	FAE12	X	Sonn Nico	ASG51
	Barlage Bernhard	AED13		Steininger Eric	AED32
	Bayer Thomas	ASA42	X	Stritter Rene	AED11
	Brune Holger	ASA45		Suess Rudi	OTN/ASA44
	Edelhoff Dirk	AED2		Wagner Klaus	ASG22
	Fehringer Alexander	ASG13	X	Wietbrock Walter	AET12
X	Fricke Wolfgang Dr.	AED 65		Wöhler Hans	ASG22
	Geiger Hermann	ASA42		Wössner Ulrich	ASE252
	Grasl Andreas	OTN/ASA44	X	Martin Olivier	ASA43
	Grasshoff Brigitte	AET12	X	Theunissen Martijn	DutchSpace
X	Hamer Simon	Terma			
X	Hendry David	Terma			
	Hengstler Reinhold	ASA42			
	Hinger Jürgen	ASG22			
X	Hohn Rüdiger	AED65			
	Hölzle Edgar Dr.	AED32			
	Huber Johann	ASA42			
	Hund Walter	ASE252			
	Idler Siegmund	AED312			
	Ivády von András	FAE12			
	Jahn Gerd Dr.	ASG22			
	Kalde Clemens	ASM2			
	Kameter Rudolf	OTN/ASA42			
	Kettner Bernhard	AET42			
	Knoblauch August	AET32	X	Alcatel Alenia Space Cannes	AAS-F
X	Koelle Markus	ASA43		Alcatel Alenia Space Torino	AAS-I
X	Koppe Axel	AED312	X	ESA/ESTEC	ESA
X	Kroeker Jürgen	AED65			
X	La Gioia Valentina	Terma		**Instruments:**	
	Lang Jürgen	ASE252		MPE (PACS)	MPE
	Langenstein Rolf	AED15	X	RAL (SPIRE)	RAL
	Langfermann Michael	ASA41		SRON (HIFI)	SRON
X	Maukisch Jan	ASA43			
X	Much Christoph	ASA43			
	Müller Jörg	ASA42		**Subcontractors:**	
X	Müller Martin	ASA43		Alcatel Alenia Space Antwerp	ABSP
	Peltz Heinz-Willi	ASG13		Austrian Aerospace	AAE
	Pietroboni Karin	AED65		Austrian Aerospace	AAEM
	Platzer Wilhelm	AED2		BOC Edwards	BOCE
	Reichle Konrad	ASA42		Dutch Space Solar Arrays	DSSA
	Runge Axel	OTN/ASA44		EADS Astrium Sub-Subsyst. & Equipment	ASSE
	Schink Dietmar	AED32		EADS CASA Espacio	CASA
	Schlosser Christian	OTN/ASA44		EADS CASA Espacio	ECAS
	Schmidt Rudolf	FAE12		European Test Services	ETS
	Schmidt Thomas	ASA42		Patria New Technologies Oy	PANT
	Schuler Günter	ASA42		SENER Ingenieria SA	SEN