



1. INTRODUCTION

This document gives a summary of the CQM functional test results from the second campaign conducted during Sept/Oct 2004. These tests also included the warm functional tests before and after the test cryostat was pumped down and cooled to 4K, as well as the cold functional tests.

The full functionality of the Herschel Common Science System (HCSS) was used in these tests after the OBS problems encountered during the first campaign were resolved and all the Common Uplink System (CUS) scripts were fully tested and available.

As in the first campaign it was ensured that all the housekeeping and science telemetry, as well as the telecommand information, was safely ingested inside the HCSS database for subsequent retrieval and playback with QLA.

1.1 Reference Documents

- RD01 SPIRE Functional Test Specification, SPIRE-RAL-DOC-001652, Issue 1.2 , 16th Aug 2004
- RD02 SPIRE Data ICD (SPIRE-RAL-PRJ-001078), Issue 1.1, 25th May 2004
- RD03 SPIRE EGSE-ILT Startup Procedures, SPIRE-RAL-DOC-001630, Issue 0.7, 24th June 2003
- RD04 DRCU Switch On Procedure, SPIRE-RAL-NOT-001899, Issue D1, 10th Dec 2003
- RD05 SPIRE CQM Functional Test Report, SPIRE-RAL-REP-002084, Issue 1, 12th July 2004
- RD06 SPIRE TFCS Data ICD, SPIRE-RAL-PRJ-001498, Issue 1.5, 11th Sept 2004

1.2 Functional Test Configuration

1.2.1 SPIRE EGSE Setup

- CDMS Simulator v2.5
- SCOS 2000 2.3e Patch Level 5 + TOPE - running on a Linux SuSE 7.3 system
- On Board Software (OBS) v1.2.J
- HCSS v0.2.1 (Build #426) – includes the EGSE router and gateway
- SPIRE CQM MIB: Internal version of S_CQM10, corresponding to the MIB for OBS 1.2J (stored in the HCSS on 25-06-2004)
- Test Facility Control System Server v1.5
- QLA v2.1 – running on a Linux SuSE 7.3 system
- EGSE Test Tool PacketDisplay to display TC and TM packet contents
- Databases used for tests:
 - cqm_test2 (all tests before and during cooldown)
 - cqm_test2a (functional tests following FPU warm up only)



2. PRE-TEST PREPARATIONS

Dry runs for the various functional tests were performed with the warm electronics and the FPU simulator. These tests exercised the full system where HCSS CUS script were run, functional tests executed and the TM from the tests ingested inside the HCSS database.

2.1 Assumptions

Before the start of functional tests the SPIRE EGSE was set up and configured using RD03 and RD04. For each set of tests the following minimum steps were also executed beforehand if they were not already activated.

Step #	Description	Status Parameter Values Before/After	Test Step Status/ Success/Fail
1	Start TM ingestion	TM ingestion process running	Success
2	Run Procedure PROC_OPER_DPU_ON	OBS running	Success
3	Run Procedure PROC_OPER_DRCU_ON	DCU and SCU on. Parameter MONSTAT=0/5	Success

Table 1 Prerequisites for start of functional tests.

3. SHORT WARM FUNCTIONAL TESTS – OUTSIDE CRYOSTAT (12-13/08/04 AND 25/08/04)

These tests were conducted twice. The first set was performed on 12-13/08/04 following which an electrical short circuit was discovered on the photometer side. Consequently the FPU was removed and taken out of the Cryo Lab. After the short circuit had been traced and fixed the FPU was brought back to the Cryo Lab and the second set of the tests were performed. Both sets of tests gave identical results. The table below therefore gives the results of the second set only.



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-SCU-01	SCU science packet generation check	OBSID: 0x30003001 SCUFRAMECNT goes from 0 to 31.	Success
FUNC-SCU-02	SCU science data check	OBSID: 0x30003002 SCUFRAMECNT goes from 31 to 62.	Success
FUNC-SCU-03	SCU DC Thermometry Check	OBSID: 0x30003003 SCUTEMPSTAT goes from 0 to 0xffff. All SCU temperature values changed to -32768, apart from SMECIFTEMP=-2325, SMECTEMP=-7143, SOBTEMP=-20189 and SUBKTEMP=31911, as on 12/08/2004.	Success
FUNC-SCU-06	SCU AC Thermometry Check	OBSID: 0x30003004 SUBKSTAT goes from 0 to 1. SUBKTEMP goes from 31911 to 31900.	Success
FUNC-SCU-07	Cooler Heaters Check	OBSID: 0x30003005 EVHSV goes from -1 to 12717 SPHSV goes from 0 to 12722 SPHTRV goes from 0 to 14393	Success
FUNC-SCU-08	SCU Test Pattern Test	OBSID: 0x30003006 SCUFRAMECNT goes from 62 to 93. Test pattern exactly the same as the one on 12/08/2004.	Success
FUNC-SCU-04	PCAL Check	OBSID: 0x30003007 PCALCURR set to 2.25mA Measured PCALCURR=2.2491mA Measured PCALV=0.5638V	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments																								
FUNC-SCU-05	SCAL Check	OBSID: 0x30003008 SCAL2CURR and SCAL4CURR set to 2.5mA Measured SCAL4CURR=2.5039mA Measured SCAL4V=1.2426V Measured SCAL2V=1.2549V Measured SCAL2CURR=2.5056mA	Success																								
FUNC-PCAL-01	PCAL Characterisation Test	OBSID: 0x30003009 The requested levels of PCAL bias were observed by QLA.	Success																								
FUNC-SCAL-01	SCAL Characterisation Test	OBSID: 0x3000300b The requested levels of SCAL4 and SCAL2 biases were observed by QLA.	Success																								
FUNC-DCU-01	DCU science packet generation check	OBSID: 0x3000300f. Requested 200 frames for each type of DCU science <table style="margin-left: auto; margin-right: auto; border: none;"> <thead> <tr> <th style="text-align: left;"></th> <th style="text-align: center;">Initial Frame count Count</th> <th style="text-align: center;">Final Frame Count</th> </tr> </thead> <tbody> <tr><td>PF:</td><td style="text-align: center;">0</td><td style="text-align: center;">200</td></tr> <tr><td>SF:</td><td style="text-align: center;">200</td><td style="text-align: center;">400</td></tr> <tr><td>PSW</td><td style="text-align: center;">400</td><td style="text-align: center;">600</td></tr> <tr><td>PMW</td><td style="text-align: center;">600</td><td style="text-align: center;">800</td></tr> <tr><td>PLW</td><td style="text-align: center;">800</td><td style="text-align: center;">1000</td></tr> <tr><td>SSW</td><td style="text-align: center;">1000</td><td style="text-align: center;">1200</td></tr> <tr><td>SLW</td><td style="text-align: center;">1200</td><td style="text-align: center;">1400</td></tr> </tbody> </table>		Initial Frame count Count	Final Frame Count	PF:	0	200	SF:	200	400	PSW	400	600	PMW	600	800	PLW	800	1000	SSW	1000	1200	SLW	1200	1400	Success DRCU/DPU ICD states that data mode 6 (corresponding to command 0x843c0006) is SSW acquisition but in fact it is SLW. CEA have been informed.
	Initial Frame count Count	Final Frame Count																									
PF:	0	200																									
SF:	200	400																									
PSW	400	600																									
PMW	600	800																									
PLW	800	1000																									
SSW	1000	1200																									
SLW	1200	1400																									
FUNC-DCU-02	DCU science data check	OBSID: 0x30003010	Success Should only run the full version of the QLA script with this test.																								



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-DCU-03	DCU test pattern test	<p>OBSID: 0x30003011 and 0x30003015</p> <p>Initial DCUFRAMECNT=2800</p> <p>Final DCUFRAMECNT=3005</p> <p>There was a minor error in the CUS script led to incorrect wait time between starting and stopping Photometer Test Pattern data generation.</p>	Success
FUNC-DCU-04	Procedure to switch Photometer LIAs on	<p>OBSID: 0x30003016</p> <p>Checked LIAs are switched on from the DRCU Power Bench LIA LEDs.</p> <p>SCUDCDCSTAT goes from 0 to 1.</p>	<p>Success</p> <p>Switching on the Photometer LIAs also switches on the Spectrometer LIAs. Known NCR.</p>
PROC-OPER-THO:	Switch off AC and DC Thermometry		Success
PROC-OPER-LIO:	Procedure to switch Photometer LIAs off		Success

Table 2 Warm functional tests outside cryostat



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4. WARM FUNCTIONAL TESTS – INSIDE CRYOSTAT (27/08/04)

Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-SCU-03	SCU DC Thermometry Check	<p>OBSID: 0x30003017</p> <p>SCUTEMPSTAT goes from 0 to 0xffff. SCU thermometry came on. All SCU temperatures at -32768 except</p> <p>SOBTEMP -20114 SMECIFTEMP -2323 SMECTEMP -7135 SUBKTEMP 31920</p> <p>These values are similar to the ones from WFT carried out on 25th Aug 2004.</p>	Success
FUNC-SCU-06	SCU AC Thermometry Check	<p>OBSID: 0x30003018</p> <p>SUBKSTAT goes from 0 to 1. SUBKTEMP goes from 31920 to 31908.</p>	Success
FUNC-SCU-07	Cooler Heaters Check	<p>OBSID: 0x30003019</p> <p>Settings: EVHS current: 0.804mA SPHS current: 0.804mA PHTR current: 21.85 mA</p> <p>Measured voltages: EVHSV: 12715 (323.54mV) SPHSV: 12722 (323.71mV) SPHTRV: 14393 (8.77mV)</p>	Success
FUNC-SCU-04	PCAL Check	<p>OBSID: 0x3000301a</p> <p>Set current to 2.25mA Measured PCALCURR: 2.24mA Measured PCALV: 0.56V</p>	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments																								
FUNC-SCU-05	SCAL Check	OBSID: 0x3000301b Settings: SCAL4CURR : 2.5mA SCAL2CURR : 2.5mA Measured SCAL4CURR: 2.5036mA Measured SCAL4V: 1.2426V Measured SCAL2CURR: 2.5057mA Measured SCAL2V: 1.2548V	Success																								
FUNC-DCU-01	DCU science packet generation check	OBSID: 0x3000301c. Requested 200 frames for each type of DCU science <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"></th> <th style="text-align: center;">Initial Frame count Count</th> <th style="text-align: center;">Final Frame Count</th> </tr> </thead> <tbody> <tr><td>PF:</td><td style="text-align: center;">0</td><td style="text-align: center;">200</td></tr> <tr><td>SF:</td><td style="text-align: center;">200</td><td style="text-align: center;">400</td></tr> <tr><td>PSW</td><td style="text-align: center;">400</td><td style="text-align: center;">600</td></tr> <tr><td>PMW</td><td style="text-align: center;">600</td><td style="text-align: center;">800</td></tr> <tr><td>PLW</td><td style="text-align: center;">800</td><td style="text-align: center;">1000</td></tr> <tr><td>SSW</td><td style="text-align: center;">1000</td><td style="text-align: center;">1200</td></tr> <tr><td>SLW</td><td style="text-align: center;">1200</td><td style="text-align: center;">1400</td></tr> </tbody> </table> 200 frames generated for each frame type.		Initial Frame count Count	Final Frame Count	PF:	0	200	SF:	200	400	PSW	400	600	PMW	600	800	PLW	800	1000	SSW	1000	1200	SLW	1200	1400	Success DRCU/DPU ICD states that data mode 6 (corresponding to command 0x843c0006) is SSW acquisition but in fact it is SLW. CEA have been informed.
	Initial Frame count Count	Final Frame Count																									
PF:	0	200																									
SF:	200	400																									
PSW	400	600																									
PMW	600	800																									
PLW	800	1000																									
SSW	1000	1200																									
SLW	1200	1400																									
FUNC-DCU-04	Procedure to switch Photometer LIAS on	OBSID: 0x3000301d The Photometer LIA LEDs switched on (turned green) SCUDCDCSTAT goes from 0 to 1 LIASSTAT remains at 0.	Success Switching on the Photometer LIAs also switches on the Spectrometer LIAs. Known NCR.																								
PROC-OPER-LIO:	Procedure to switch Photometer LIAS off		Success																								
PROC-OPER-THO:	Switch off AC and DC Thermometry		Success																								



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
PROC-OPER-SPIRE-DRCU-OFF	Switch off the DRCU	The secondary power is off, but primary power is still on.	Success
PROC-OPER-SPIRE-DPU-OFF	Switch off the DPU		Success

Table 3 Warm functional tests inside cryostat

5. WARM FUNCTIONAL TESTS – AFTER PUMP DOWN (02/09/04)

The vacuum chamber pressure was $\sim 3 \times 10^{-5}$ mbar before the commencement of these tests.

Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-SCU-01	SCU science packet generation check	OBSID: 0x30003020	Success
FUNC-SCU-03	SCU DC Thermometry Check	OBSID: 0x30003021 SCUTEMPSTAT goes from 0 to 0xffff. SCU thermometry came on. All SCU temperatures at -32768 except SOBTEMP -20030 SMECIFTEMP -2325 SMECTEMP -7125 SUBKTEMP 31915 These values are similar to the ones from WFT carried out on 27 th Aug 2004.	Success
FUNC-SCU-06	SCU AC Thermometry Check	OBSID: 0x30003022 SUBKSTAT: 0 to 1 SUBKTEMP 31915 to 31904	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments																											
FUNC-SCU-07	Cooler Heaters Check	OBSID: 0x30003023 Settings: EVHS current: 0.804mA SPS current: 0.804mA PHTR current: 21.85 mA Measured voltages: EVHSV: 12715 (323.54mV) SPSV: 12713 (323.49mV) SPHTRV: 14393 (8.77mV)	Success																											
FUNC-SCU-04	PCAL Check	OBSID: 0x30003025 PCAL bias set to 2.25 mA Measured PCALCURR 2.2489mA PCALV=0.5633V.	Success																											
FUNC-SCU-05	SCAL Check	OBSID: 0x30003026 Settings: SCAL4 and SCAL2 currents 2.5mA. Measured values: SCAL4CURR 2.5036mA SCAL4V 1.2426V SCAL2CURR 2.5055mA SCAL4V 1.2548V	Success																											
FUNC-DCU-01	DCU science packet generation check	OBSID: 0x30003027. Requested 200 frames for each type of DCU science <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Initial Frame count</th> <th>Final Frame</th> </tr> <tr> <th></th> <th>Count</th> <th>Count</th> </tr> </thead> <tbody> <tr> <td>PF:</td> <td>0</td> <td>200</td> </tr> <tr> <td>SF:</td> <td>200</td> <td>400</td> </tr> <tr> <td>PSW</td> <td>400</td> <td>600</td> </tr> <tr> <td>PMW</td> <td>600</td> <td>800</td> </tr> <tr> <td>PLW</td> <td>800</td> <td>1000</td> </tr> <tr> <td>SSW</td> <td>1000</td> <td>1200</td> </tr> <tr> <td>SLW</td> <td>1200</td> <td>1400</td> </tr> </tbody> </table>		Initial Frame count	Final Frame		Count	Count	PF:	0	200	SF:	200	400	PSW	400	600	PMW	600	800	PLW	800	1000	SSW	1000	1200	SLW	1200	1400	Success DRCU/DPU ICD states that data mode 6 (corresponding to command 0x843c0006) is SSW acquisition but in fact it is SLW. CEA have been informed.
	Initial Frame count	Final Frame																												
	Count	Count																												
PF:	0	200																												
SF:	200	400																												
PSW	400	600																												
PMW	600	800																												
PLW	800	1000																												
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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-DCU-04	Procedure to switch Photometer LIAs on	OBSID: 0x30003028 The Photometer LIA LEDs switched on (turned green) SCUDCDCSTAT goes from 0 to 1 LIASTAT remains at 0.	Success Switching on the Photometer LIAs also switches on the Spectrometer LIAs. Known NCR.
PROC-OPER-LIO:	Procedure to switch Photometer LIAs off		Success
PROC-OPER-THO:	Switch off SCU AC Thermometry	The SCU DC thermometry was left on prior to cool down	Success

Table 4 Warm functional tests after pump down

6. FUNCTIONAL TESTS WITH T ~ 90 K (7/09/04)

The SPIRE Optical Bench temperature (SCU parameter SOBTEMP) before these tests was 70.19K.

Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-SCU-06	SCU AC Thermometry Check	OBSID: 0x30003042 SUBKSTAT: 0 to 1 SUBKTEMP: 7.57K (Value of the calibration range)	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-SCU-07	Cooler Heaters Check	OBSID: 0x30003043 Settings: EVHS current: 0.804mA SPHS current: 0.804mA PHTR current: 21.85 mA Measured voltages; EVHSV: 324.14 mV SPHSV: 323.71mV No changes in EVAPHSTEMP and PUMPHSTEMP values of 52.70K and 47.40K respectively. SPHTRV: 14393 (8.7761mV) PUMPHTRTEMP: 65.66K to 65.97K. (At the end of test: 65.77K)	Success
FUNC-SCU-04	PCAL Check	OBSID: 0x30003044 Set current to 2.25mA Measured PCALCURR: 2.2486mA Measured PCALV: 0.5647V	Success
FUNC-SCU-05	SCAL Check	OBSID: 0x30003045 Settings: SCAL4CURR : 2.5mA SCAL2CURR : 2.5mA Measured SCAL4CURR: 2.5041mA Measured SCAL4V: 1.2457V SCAL4TEMP: 74.64K to 75.73K Measured SCAL2CURR: 2.5057mA Measured SCAL2V: 1.2577V SCAL2TEMP: 74.72K to 77.02K	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments																											
FUNC-DCU-01	DCU science packet generation check	OBSID: 0x30003046. Requested 100 frames for each type of DCU science <table border="0"> <tr> <td></td> <td align="center">Initial Frame count</td> <td align="center">Final Frame</td> </tr> <tr> <td></td> <td align="center">Count</td> <td align="center">Count</td> </tr> <tr> <td>PF:</td> <td align="right">40846</td> <td align="right">40946</td> </tr> <tr> <td>SF:</td> <td align="right">40946</td> <td align="right">41046</td> </tr> <tr> <td>PSW</td> <td align="right">41046</td> <td align="right">41146</td> </tr> <tr> <td>PMW</td> <td align="right">41146</td> <td align="right">41246</td> </tr> <tr> <td>PLW</td> <td align="right">41246</td> <td align="right">41346</td> </tr> <tr> <td>SSW</td> <td align="right">41346</td> <td align="right">41446</td> </tr> <tr> <td>SLW</td> <td align="right">41446</td> <td align="right">41546</td> </tr> </table>		Initial Frame count	Final Frame		Count	Count	PF:	40846	40946	SF:	40946	41046	PSW	41046	41146	PMW	41146	41246	PLW	41246	41346	SSW	41346	41446	SLW	41446	41546	Success DRCU/DPU ICD states that data mode 6 (corresponding to command 0x843c0006) is SSW acquisition but in fact it is SLW. CEA have been informed.
	Initial Frame count	Final Frame																												
	Count	Count																												
PF:	40846	40946																												
SF:	40946	41046																												
PSW	41046	41146																												
PMW	41146	41246																												
PLW	41246	41346																												
SSW	41346	41446																												
SLW	41446	41546																												
FUNC-DCU-04	Procedure to switch Photometer LIAs on	OBSID: 0x30003047 The Photometer LIA LEDs switched on (turned green) SCUDCDCSTAT goes from 0 to 1 LIASTAT remains at 0.	Success Switching on the Photometer LIAs also switches on the Spectrometer LIAs. Known NCR.																											
PROC-OPER-LIO:	Procedure to switch Photometer LIAs off		Success																											

Table 5 Functional tests before filling with He

7. COLD FUNCTIONAL TESTS WITH THE FPU < 10K (10/09/04 AND 13/09/04)

It was ensured that the FPU temperature was at 1.7K before the start of these cold functional tests. The L0 Pump Strap temperature (TFCS parameter T_L0_PSTR) was 1.78K (≡ raw resistance 673.85Ω), while the L0 Evaporator Strap temperature (TFCS parameter T_L0 ESTR) was 1.77K (≡ raw resistance 751.49Ω).

As the SCU DC and AC thermometry was already on it was therefore not necessary to perform **FUNC-SCU-03 and FUNC-SCU-06.**



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FUNC-SCU-01	SCU science packet generation check	OBSID: 0x3000304e SCUFRAMECNT goes from 31 to 62. 31 frames received in two SCU packets	Success
FUNC-SCU-02	SCU science data check	OBSID: 0x3000304f SCUFRAMECNT goes from 62 to 93. 31 frames received in two SCU packets	Success
FUNC-SCU-07	Cooler Heaters Check	OBSID: 0x30003050 Settings: EVHS & SPS currents set to 0.804mA SPHTR current set to 21.85mA Measurements: EVHSV goes from -1 to 12791 (325.47mV) PUMPHSTEMP = 3.38K (-3822) to 5.25K (-5971) SPHSV goes from -1 to 12788 (325.39mV) EVAPHSTEMP = 3.26K (-4215) to 5.20K (-6690) SPHTRV goes from 0 to 14393 (8.78mV) PUMPHTRTEMP = 3.54K (-2979) to 9.78K (-7332)	Success
FUNC-SCU-08	SCU Test Pattern Test	OBSID: 0x30003052 SCUFRAMECNT goes from 124 to 155. Two TM(21,3) science packets with APID 0x0508 and SID=0x1121.	Success Agrees with test pattern created under OBSID 0x30003006. Also agrees with previous test patterns, so same test pattern appears to be generated everytime.



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FUNC-SCU-04	PCAL Check	OBSID: 0x30003053 PCALCURR set to 2.25mA Measured PCALCURR=2.2494mA Measured PCALV=0.5673V	Success
FUNC-SCU-05	SCAL Check	OBSID: 0x30003054 SCAL4CURR and SCAL2CURR set to 2.5mA Measured SCAL4CURR=2.5036mA (Raw 14095) Measured SCAL4V=1.2465V (Raw 12463) Measured SCAL2V=1.2581V (Raw 12579) Measured SCAL2CURR=2.5055mA (Raw 14106)	Success SCAL4 voltages and currents now do change in accordance to commanded values. NCR HR-SP-RAL-NCR-64, which was raised during the cold functional tests of the first CQM test campaign, does not appear to be an issue in this campaign.
FUNC-PCAL-01	PCAL Characterisation Test	OBSID: 0x30003055 Start PCAL Bias = 1.0mA Step PCAL Bias= 1.5mA End PCAL Bias = 7.5mA QLA created file ~hcssbld/qla/data/FuncTestData/FUNC-PCAL-01_30003055_8300.fits on Salisbury. The requested levels of PCAL bias were observed by QLA.	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/Success/Fail/Comments																								
FUNC-SCAL-01	SCAL Characterisation Test	<p>OBSID: 0x30003056</p> <p>SCAL temperatures before the test: SCAL2TEMP = 4.76K SCAL4TEMP = 12.42K SCALTEMP = 4.59K</p> <p>SCAL2 and SCAL4 biases = 1, 2, 3, 4, 5, 5.5mA</p> <p>The requested levels of SCAL4 and SCAL2 biases were observed by QLA.</p> <p>QLA created two files in ~hcssbld/qla/data/FuncTestData/ on Salisbury. FUNC-SCAL-01_30003056_8400.fits FUNC-SCAL-01_30003056_8401.fits</p>	<p>Success</p> <p>SCAL4 voltages and currents now do change in accordance to commanded values. NCR HR-SP-RAL-NCR-64, which was raised during the cold functional tests of the first CQM test campaign, does not appear to be an issue in this campaign. See Figure 1.</p>																								
FUNC-DCU-01	DCU science packet generation check	<p>OBSID: 0x30003057</p> <p>Requested 100 frames for each type of DCU science</p> <table style="margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"></th> <th style="text-align: center;">Initial Frame Count</th> <th style="text-align: center;">Final Frame Count</th> </tr> </thead> <tbody> <tr><td>PF:</td><td style="text-align: center;">41546</td><td style="text-align: center;">41646</td></tr> <tr><td>SF:</td><td style="text-align: center;">41646</td><td style="text-align: center;">41746</td></tr> <tr><td>PSW</td><td style="text-align: center;">41746</td><td style="text-align: center;">41846</td></tr> <tr><td>PMW</td><td style="text-align: center;">41846</td><td style="text-align: center;">41946</td></tr> <tr><td>PLW</td><td style="text-align: center;">41946</td><td style="text-align: center;">42046</td></tr> <tr><td>SSW</td><td style="text-align: center;">42046</td><td style="text-align: center;">42146</td></tr> <tr><td>SLW</td><td style="text-align: center;">42146</td><td style="text-align: center;">42246</td></tr> </tbody> </table>		Initial Frame Count	Final Frame Count	PF:	41546	41646	SF:	41646	41746	PSW	41746	41846	PMW	41846	41946	PLW	41946	42046	SSW	42046	42146	SLW	42146	42246	<p>Success</p> <p>DRCU/DPU ICD states that data mode 6 (corresponding to command 0x843c0006) is SSW acquisition but in fact it is SLW. CEA have been informed.</p>
	Initial Frame Count	Final Frame Count																									
PF:	41546	41646																									
SF:	41646	41746																									
PSW	41746	41846																									
PMW	41846	41946																									
PLW	41946	42046																									
SSW	42046	42146																									
SLW	42146	42246																									
FUNC-DCU-02	DCU science data check	<p>OBSID: 0x30003058</p> <p>100 frames for each type.</p> <p>Initial DCUFRAMECNT is 42246. Final DCUFRAMECNT is 42946.</p>	<p>Success</p>																								



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-DCU-03	DCU test pattern test	<p>OBSID: 0x30003059</p> <p>100 frames for each type.</p> <p>Phot Test Pattern: Initial DCUFRAMECNT=42946 Final DCUFRAMECNT=43046</p> <p>Spec Test Pattern: Initial DCUFRAMECNT=43046 Final DCUFRAMECNT=43146</p> <p>Test pattern agrees with OBSID 0x30003015</p>	Success
FUNC-DCU-04	Procedure to switch Photometer LIAs on	<p>OBSID: 0x3000305a</p> <p>Checked LIAs are switched on from the DRCU Power Bench LIA LEDs.</p> <p>SCUDCDCSTAT goes from 0 to 1.</p>	<p>Success</p> <p>Switching on the Photometer LIAs also switches on the Spectrometer LIAs. Known NCR.</p>
FUNC-DCU-05P	DCU Photometer Offset test	<p>OBSID: 0x3000305b</p> <p>QLA produced three FITS files in /home/hcssbld/qla/data/FuncTestData:</p> <p>QLA-DCU-05-photfull_3000305B_8_Means.fits QLA-DCU-05-photfull_3000305B_8_Offsets.fits QLA-DCU-05-photfull_3000305B_8_Sigmas.fits</p>	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-DCU-05S	DCU Spectrometer Offset test	<p>OBSID: 0x3000305c</p> <p>Offset packets generated.</p> <p>QLA produced three FITS files in /home/hcssbld/qla/data/FuncTestData:</p> <p>QLA-DCU-05-specfull_3000305C_8_Means.fits QLA-DCU-05-specfull_3000305C_8_Offsets.fits QLA-DCU-05-specfull_3000305C_8_Sigmas.fits</p>	Success
FUNC-DCU-06P	DCU Photometer JFET heaters test	<p>OBSID: 0x3000305e</p> <p>Setting one level of heater bias (255) for 60 seconds.</p> <p>No discernible change in the PJFET chassis temperature T_PJFS_CHAS of ~18K.</p>	Success (Left the heater bias on for ~3 minutes following FUNC-DCU-06P. T_PJFS_CHAS increased from ~18K to ~20K)
FUNC-DCU-06S	DCU Spectrometer JFET heaters test	<p>OBSID: 0x3000305f</p> <p>Settings: Initial heater bias: 0 End heater bias: 255 Step: 51</p> <p>T_SJFS_CHAS: 15.44K to 15.67K at the end of the test</p>	Success
FUNC-DCU-11	DCU detectors switch on	<p>OBSID: 0x30003063</p> <p>Settings: Only PLW array switched on Cold (JFET heaters turned on for 1 minute) Bias Freq: 200Hz Sampling Freq 15Hz Bias amplitude 35mV Demod phase 0 JFET Vss -2.5V</p>	Success



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Test Name	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail /Comments
FUNC-DCU-10	Bias Amplitude test	OBSID: 0x30003064 Settings: 5 levels, 30 seconds at each bias level 0 to 255 in steps of 51. Bias freq 200Hz Sampling Freq 15Hz	Success
FUNC-DCU-07P	Photometer JFET Vss test	OBSID: 0x30003083 6 steps from -1V to -3V dwell time 30 secs per step	Success

Table 6 Cold functional tests with FPU at ~1.7K

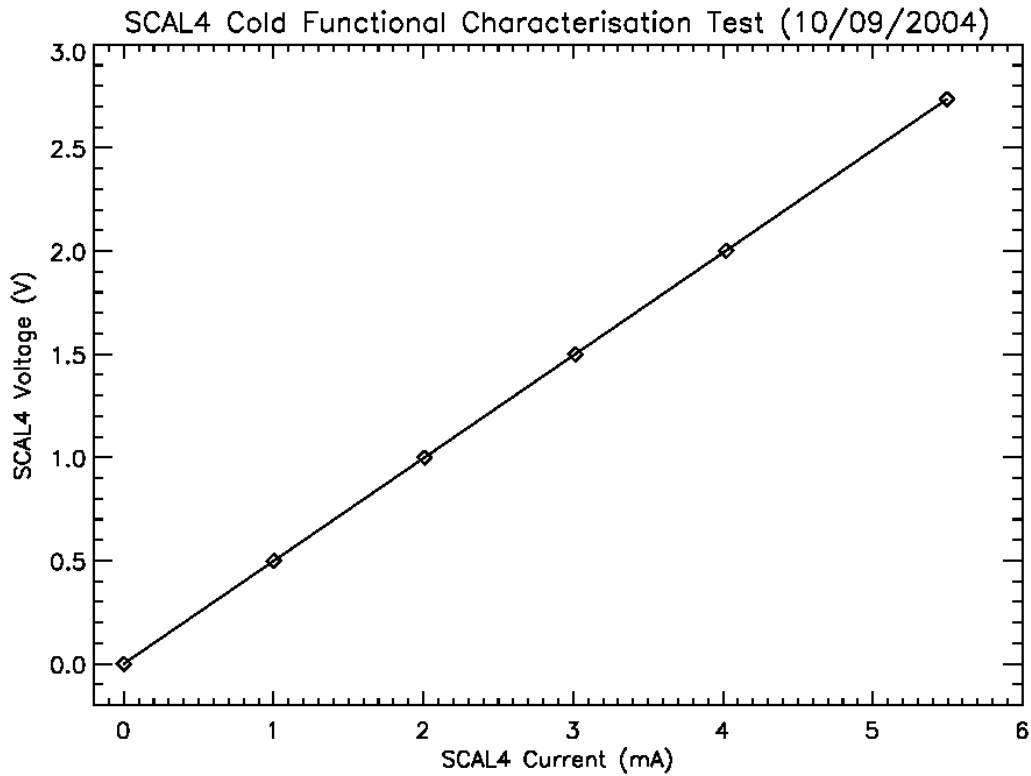


Figure 1 Results of the SCAL4 cold functional characterisation test.

8. WARM FUNCTIONAL TESTS – FOLLOWING FPU WARMUP (21/10/04)



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The data from the following tests was ingested into a new database called cqm_test2a as there was an ingestion problem with the original one used during the early functional and performance tests.

Test Name /OBSID	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail
FUNC-SCU-01	SCU Science Packet Generation Check	OBSID: 0x30000138 SCUFRAMECNT increased from 64188 to 64219 (Two SCU science packets received of length 988 and 928 bytes)	Success
FUNC-SCU-02	SCU Science Data Check	OBSID: 0x3000013a SCUFRAMECNT goes from 64250 to 64281 (Two SCU science packets received of length 988 and 928 bytes)	
FUNC-SCU-07	Cooler Heaters Check	OBSID: 0x3000013b Settings: EVHS and SPHS current = 0.804mA Input SPHTR current = 21.85mA EVHSV goes from -2 to 12717 (323.53mV) PUMPHSTEMP = -32768 before & after SPHSV goes from -3 to 12722 (323.71mV) EVAPHSTEMP = -32768 before & after SPHTRV goes from -1 to 14392 (8.78mV) PUMPHTRTEMP = -32768 before & after	Success
FUNC-SCU-08	SCU Test Pattern Test	OBSID: 0x3000013c SCUFRAMECNT goes from 64281 to 64312. Two (21,3) science packets (lengths 988 and 928 bytes) with APID 0x508, SID=0x1121 received. Agrees with test pattern created under OBSID 0x30003052. Also agrees with previous test patterns, so same test pattern appears to be generated every time.	Success



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Test Name /OBSID	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail
FUNC-SCU-04	PCAL Check	OBSID: 0x3000013d PCAL bias set to 2.25 mA Measured PCALCURR 2.2484mA (raw 9061) PCALV=0.5633V (raw 11041)	Success
FUNC-SCU-05	SCAL Check	OBSID: 0x3000013e SCAL4CURR and SCAL2CURR set to 2.5mA Measured SCAL4 values: SCAL4CURR=2.5037mA (Raw 14095) Measured SCAL4V=1.2426V (Raw 12427) SCAL4TEMP before and after -32768 Measured SCAL2 values: SCAL2V=1.2546V (Raw 12548) Measured SCAL2CURR=2.5053mA (Raw 14106) SCAL2TEMP before and after -32768	Success
FUNC-PCAL-01	PCAL Characterisation Test	OBSID: 0x3000013f Start PCAL Bias = 1.0mA Step PCAL Bias= 1.5mA End PCAL Bias = 7.5mA PCAL bias steps were 1, 2.5, 4, 5.5 and 7mA.	Success
FUNC-SCAL-01	SCAL Characterisation Test	OBSID: 0x30000140 SCAL2 and SCAL4 biases = 1, 2, 3, 4, 5, 5.5mA All the SCAL temperatures were out of range at -32768, as expected.	Success



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Test Name /OBSID	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail																								
FUNC-DCU-01	DCU Science Packet Generation Check	OBSID: 0x30000141 Requesting 50 frames for each type of DCU science <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: left;">Type</td> <td style="text-align: left;">Initial Frame Count</td> <td style="text-align: left;">Final Frame Count</td> </tr> <tr> <td>PF:</td> <td>25101</td> <td>25151</td> </tr> <tr> <td>SF:</td> <td>25151</td> <td>25201</td> </tr> <tr> <td>PSW</td> <td>25201</td> <td>25251</td> </tr> <tr> <td>PMW</td> <td>25251</td> <td>25301</td> </tr> <tr> <td>PLW</td> <td>25301</td> <td>25351</td> </tr> <tr> <td>SSW</td> <td>25351</td> <td>25401</td> </tr> <tr> <td>SLW</td> <td>25401</td> <td>25451</td> </tr> </table>	Type	Initial Frame Count	Final Frame Count	PF:	25101	25151	SF:	25151	25201	PSW	25201	25251	PMW	25251	25301	PLW	25301	25351	SSW	25351	25401	SLW	25401	25451	Success
Type	Initial Frame Count	Final Frame Count																									
PF:	25101	25151																									
SF:	25151	25201																									
PSW	25201	25251																									
PMW	25251	25301																									
PLW	25301	25351																									
SSW	25351	25401																									
SLW	25401	25451																									
FUNC-DCU-02	DCU Science Data Check	OBSID: 0x30000142 50 frames for each type. Initial DCUFRAMECNT is 25451. Final DCUFRAMECNT is 25801.	Success																								
FUNC-DCU-03	DCU Test Pattern Test	OBSID: 0x30000143 Photometer Test Pattern: Initial DCUFRAMECNT=25801 Final DCUFRAMECNT=25851 Spectrometer Test Pattern: Initial DCUFRAMECNT=25851 Final DCUFRAMECNT=25901 Test patterns agree with OBSID 0x30003059	Success																								
FUNC-DCU-04	DCU LIAs switch on	OBSID: 0x30000144 SCUDCCDCSTAT goes from 0 to 1.	Success The new PSU was being used here rather than old DRCU Power Bench.																								
PROC-OPER-LIO:	Procedure to switch Photometer LIAs off	SCUDCCDCSTAT goes from 1 to 0	Success																								
PROC-OPER-THO:	Procedure to switch off both SCU DC and AC Thermometry	SCUTEMPSTAT goes from 0xffff to 0 SUBKSTAT goes from 1 to 0.	Success																								



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Test Name /OBSID	Description	Key Parameter Values Before/After or ranges	Test Status/ Success/Fail
PROC-OPER-DRO:	Procedure to switch off DRCU	MONSTAT = 5 / 0	Success
PROC-OPER-DPO:	Procedure to switch off DPU		Success

Table 7 Warm functional tests after FPU warm up



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9. CONCLUSIONS

All the warm and cold functional tests conducted during the second CQM test campaign were totally successful. The experience gained by the AIV team during this test campaign will be invaluable for the forthcoming EQM tests and for the subsequent PFM tests.