



Technical Note

SPIRE SPT Execution Report
Compiled by B Swinyard

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Scope

We describe the problems encountered during the execution of the SPIRE Special Performance Tests carried out at system level between August the 20th and August 23rd 2008. We also identify the data sets available, comment on their quality and allocate the analysis of the data to different team members. Finally we identify the tests that require repeating in order to complete the performance verification of the SPIRE instrument at system level and provide the initial operating parameters for SPIRE once in flight.

Reference/Applicable Documents

AD1 SPIRE IST Specific Performance Test Procedures SPIRE-RAL-PRC-2704
RD1 SPIRE SPT Daily Log 20-23 August

Description of test

See appendix 1 for the “As Run” test sequence, see AD1 for the description of the tests that were attempted and RD1 one for the daily log describing the action. Overall the sequence of tests was designed to show that SPIRE was scientifically operational following integration into the cryostat and environmental testing. There were some additional tests designed to characterise the EMC performance, the thermal stabilisation system for SPIRE, the microphonic response of the detectors whilst the AOCS was operational and the BSM tuning. The basic test consisted of getting the detectors to operating temperature checking what temperature the detectors were operating at and evaluating their noise and optical response. This was attempted for both the spectrometer and photometer detectors.

Problems Encountered

In table 1 we list the more serious problems that were encountered with the tests and comment on the test outcomes. Rather than doing this test by test we have gathered similar problems together and numbered them.

Problem Number	Description	Test Applies to	Outcome/Solution/Action
SPT-1	Mismatch between expected number of commands in template and those in database due to error in CCS handler.	AD1 2.1 AD1 2.8 AD1 2.15	Standalone scripts generated and ran o.k. Tests need repeating with correct script as this is a critical commissioning phase test. CCS error now corrected.
SPT-2	EGSE Router failed during test and telemetry to IGSE lost (see RD 1 entry for 14:51 20/08/08)	General	Loss of test time (~5 hours) IEGSE rebooted and (eventually) contact re-established. Cause of failure not yet established to be followed up.
SPT-3	On restarting IEGSE the firewall was started preventing connection of the machine.	General	IEGSE start procedure to be modified to include instructions for stopping the firewall
SPT-4	Scripts were not present on the system.	AD1 2.4 AD1 2.9	Scripts had not been delivered to operators but were present on EGSE. Scripts delivered by e-mail. Verification that all scripts are present should be part of TRR?
SPT-5	Housekeeping not started following BSM_ON procedure	General	Error in script – NCR raised now corrected.
SPT-6	Periodic oscillations seen on detectors – but not resistors or thermistors	All noise measurements; EMC and	Traced to cooling of the cryostat lid via recycling system. All noise measurements will need to



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Problem Number	Description	Test Applies to	Outcome/Solution/Action
		microphonics tests	be repeated during TV/TB - EMC results appear to be ok. Microphonics tests to be checked.
SPT-7	Detector biases not set following standard switch on procedure.	General	Error in procedures – to be updated to include definitive prerequisite to set detector conditions. General switch on procedure (REDY-STDBY) updated to include commands to set bias to default.
SPT-8	Offsets not set correctly at beginning of phase up and noise procedures	AD1 2.4 AD1 2.5 AD1 2.12 AD1 2.13	Offsets get set only at the end of the first step – script to be changed to add initial offset setting. To be repeated during TV/TB.
SPT-9	Automatic cooler recycle timed out because pump heater didn't reach 2.2 K. Heat switch required manual commanding to complete recycle	AD1 2.3 (all ground cooler recycles)	Loop parameters changed. VM needs critical evaluation to ensure time outs occur correctly and default is to close pump heat switch not turn everything off.
SPT-10	BSM chop tuning script failed due to negative wait time in script.	AD1 2.1	Script updated in real time and re-run. Test may require repetition – see SPT-1
SPT-11	Incorrect phase set during spectrometer loadcurve.	AD1 2.15	Error in script prepared at Estec. New script needed due to problem indentified in SPT-1. Will need to be re-run during TV/TB
SPT-12	VM to control SCAL did not run	AD1 2.16	Incorrect VM table loaded in DPU. This was due to tables not being uploaded following switch on. SPIRE switch on procedure to be altered to a) ensure any tables are loaded and b) do check on memory contents to ensure configuration is as expected.
SPT-13	VM to control PTC did not run	AD1 2.10	Problem not fixed during SPT and procedures not carried out. Problem has been traced to incorrect table format in OBS. Will be rectified with new version of software. Test will need to be re-run during TV/TB.



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Analysis Tasks

Task Number	Description	Test Applies to	Allocated to/report
SPT-ANAL-1	Cooler recycling – investigation of thermal behaviour and holdtime	AD1 2.2 AD1 2.3	Lionel Duband HSO-SBT-TN-153
SPT-ANAL-2	EMC tests – investigation of presence and level of EMC susceptibility on detectors	?	Doug Griffin Report pending
SPT-ANAL-3	Detector bias phaseups – mostly identified optimum phase in real time (see RD1). Detailed analysis can provide useful information on variation across array	AD1 2.4 AD1 2.12	Darren Dowell Spectrometer report at http://www.submm.caltech.edu/~cdd/SPIRE/20080908_phases/
SPT-ANAL-4	PCAL illumination and comparison to ILT results for photometer and spectrometer	AD1 2.11 AD1 2.17 AD1 4.7 AD1 4.8	Bruce Swinyard Report pending
SPT-ANAL-5	BSM control parameter determination.	AD1 2.1	Tanya Lim Report pending
SPT-ANAL-6	Thermal response of 300-mK system to PTC power increase	AD1 2.9	Jamie Bock Report pending
SPT-ANAL-7	Detector noise performance as a function of bias frequency and amplitude	AD1 2.5 AD1 2.6 AD1 2.13 AD1 2.14	IPAC See reports at https://nhscdmz1.ipac.caltech.edu/pmwiki/pmwiki.php/Spire/SPTNoiseTests

Summary of tests to be repeated during TV/TB

- AD1 2.1 BSM Control Loop Setting
- AD1 2.4 Photometer bias phase optimisation
- AD1 2.5 Photometer bias noise optimisation
- AD1 2.6 Photometer noise stability versus bias frequency
- AD1 2.8 Photometer Ambient Background Verification
- AD1 2.10 Photometer Thermal Control Verification
- AD1 2.12 Spectrometer bias phase optimisation
- AD1 2.13 Spectrometer bias noise optimisation
- AD1 2.14 Spectrometer noise stability versus bias frequency
- AD1 2.15 Spectrometer Ambient Background Verification

We also need to add a new procedure to evaluate the gain of the system as a function of bias phase as there is some concern about whether the system is linear. This will added as a new procedure in a future issue of AD1



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Extract from "As Run" Test Summary from Bernard Collaudin

		AIT proc	SPIRE proc		Comment	Start	End	Duration
	SPIRE SPT Day 1							
4	D1	7.5.3.3	2.1	BSM Control Loop Setting	Not successful 1st time (problem with script version) BSM1 & BSM3 run	20/08/2008 07:21	20/08/2008 10:51	3:30
1	D1	7.5.3.1	2.2	Cooler Recycle (manual)		20/08/2008 10:53	20/08/2008 12:40	1:47
2	D1	7.5.3.2		Switch from REDY to Photometer STBY Mode		20/08/2008 13:02	20/08/2008 13:11	0:09
13	D1	7.5.3.10	2.25; 2.27	Overnight (Day 1 – Day 2) EMC CS Test - Photometer	Instrument switch Off to connect/disconnect EMC equipment	20/08/2008 21:40	21/08/2008 01:13	3:33
14				Overnight (Day 1 – Day 2) EMC RS Test		21/08/2008 01:15	21/08/2008 06:02	4:47
6	D1	7.5.3.4	2.4	Photometer Bias Phase Optimisation		21/08/2008 08:28	21/08/2008 14:38	6:10
33	D3	7.5.5.2	2.3	Cooler Recycle (automatic)		21/08/2008 09:49	21/08/2008 12:20	2:31
8	D1	7.5.3.6	2.5	Photometer Bias Noise Optimisation		21/08/2008 16:02	21/08/2008 18:33	2:31



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		AIT proc	SPIRE proc		Comment	Start	End	Duration
9	D1	7.5.3.7	2.8	Photometer Ambient Background Verification	reperformed on 22/8 ?	21/08/2008 18:53	21/08/2008 19:16	0:23
12	D1	7.5.3.9	2.11	PCAL Photometer Characterisation		21/08/2008 19:32	21/08/2008 20:08	0:36
5				BSM Control Loop Setting (retest)	retest	21/08/2008 22:38	22/08/2008 01:41	3:03
44	D3	7.5.5.8		Reaction Wheel Operation for Spectrometer		22/08/2008 00:01	22/08/2008 00:27	0:26
11	D1	7.5.3.8	2.9	PTC Headroom Characterisation		22/08/2008 02:42	22/08/2008 06:03	3:21
10	D1	7.5.3.7	2.8	Photometer Ambient Background Verification	reperformed on 22/8 ?	22/08/2008 06:56	22/08/2008 07:45	0:49
37	D3	7.5.5.3	2.12	Spectrometer Bias Phase Optimisation		22/08/2008 08:10	22/08/2008 09:19	1:09
34				Cooler Recycle (automatic)	additional needed	22/08/2008 09:32	22/08/2008 12:04	2:32
38	D3	7.5.5.4	2.13	Spectrometer Bias Noise Optimisation		22/08/2008 12:30	22/08/2008 14:26	1:56
39	D3	7.5.5.5	2.14	Spectrometer Noise Stability versus Bias Frequency		22/08/2008 14:29	22/08/2008 16:02	1:33
16	D2	7.5.4.1	4.7	PCAL Flash	run several times	22/08/2008 16:04	22/08/2008 17:22	1:18



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		AIT proc	SPIRE proc		Comment	Start	End	Duration
40				Spectrometer Ambient Background Verification	Was not in RAL or ASSED Procedure	22/08/2008 16:04	22/08/2008 18:10	2:06
41	D3	7.5.5.6	2.16	SCAL Characterisation		22/08/2008 18:14	22/08/2008 21:40	3:26
45	D3	7.5.5.9	2.22	Spectrometer Detector Microphonics Test		22/08/2008 22:41	23/08/2008 00:30	1:49
44	D3	7.5.5.8		Reaction Wheel Operation for Spectrometer		22/08/2008 22:56	22/08/2008 23:21	0:25
44	D3	7.5.5.8		Reaction Wheel Operation for Spectrometer		22/08/2008 23:28	22/08/2008 23:56	0:28
46	D3		4.1	Switch from Spec stby to REDY		23/08/2008 00:35	23/08/2008 00:36	0:01
47			4.2	Switch from REDY to PHOT STBY		23/08/2008 00:38	23/08/2008 00:42	0:04
7	D1	7.5.3.5	2.6	Photometer Noise Stability versus Bias Frequency		23/08/2008 01:04	23/08/2008 01:30	0:26
17	D2	7.5.4.2	2.7	Photometer Thermal Stability versus Bias Amplitude		23/08/2008 01:06	23/08/2008 01:30	0:24
49	D3	7.5.5.11	2.21	Photometer Detector Microphonics Test	Done partly the Night 22 to 23/8	23/08/2008 01:46	23/08/2008 02:37	0:51
48	D3	7.5.5.10		Reaction Wheel Operation for Photometer		23/08/2008 01:55	23/08/2008 03:14	1:19
35				Cooler Recycle (automatic)	This one should not have been launched here. We do not know the hold time with the new automatic procedure	23/08/2008 03:00	23/08/2008 05:32	2:32



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#	D	AIT proc	SPIRE proc	Description	Comment	Start	End	Duration
48	D3	7.5.5.10		Reaction Wheel Operation for Photometer		23/08/2008 09:15	23/08/2008 09:49	0:34
50	D3	7.5.5.11	2.21	Photometer Detector Microphonics Test	Reperformed Saturday morning Done with T oscillations (13 to 16K) on the cover temperature	23/08/2008 09:18	23/08/2008 10:27	1:09
48	D3	7.5.5.10		Reaction Wheel Operation for Photometer		23/08/2008 09:55	23/08/2008 10:23	0:28
52	D3	7.5.6		Switch Off		23/08/2008 11:46	23/08/2008 11:51	0:05
3				Wait for Stabilisation				
15	SPIRE SPT Day 2	7.5.4		Integrated System Tests – SPIRE SPT Day 2				
18	D2	7.5.4.3	2.10	Change of LID temperature				
19	D2	7.5.4.4	2.9	Photometer Thermal Control Verification	No trace of any on these scripts in the log - Script failure - is part of TV To be validated before TV - NCR to be raise.			
20	D2	7.5.4.5	2.4	Photometer Bias Phase Optimisation	Cooler recycling in between 100 & 130			
21	D2	7.5.4.6	2.8	Photometer Ambient Background				
22			4.1	Switch from Photo Stby to REDY				
23			4.4	Switch from REDY to SPECSTBY Mode				
24	D2	7.5.4.7	2.12	Spectrometer Bias Phase Optimisation				



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No.	AIT proc	SPIRE proc	Description	Comment	Start	End	Duration
25	D2	7.5.4.8	2.13	Spectrometer Bias Noise Optimisation			
26	D2	7.5.4.9	2.14	Spectrometer Noise Stability versus Bias Frequency			
27	D2	7.5.4.10	2.15	Spectrometer Ambient Background Verification			
28	D2	7.5.4.11	2.17	PCAL Spectrometer Characterisation			
29	D2	7.5.4.12		Overnight Hold on Test Activities			
30	SPIRE SPT Day 3	7.5.5		Integrated System Tests – SPIRE SPT Day 3			
31	D3	7.5.5.1		Change of LID temperature			
32	D3		4.1	Switch from Spec stby to REDY			
36	D3			Stabilisation			
42				PCAL Flash Spectrometer	was not inr ASED Procedure, but included in most of sequences		
43	D3	7.5.5.7		Microphonics Pre-Test Configuration	Switch on ACMS		
51	D3	7.5.5.12		Microphonics Post-Test Configuration			



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