EADS astrium

Test Report

Herschel

Title: Test Report for SPIRE TBTV Functional Test In TB Hot (Phase 10)

CI-No: 112 200

Prepared by:	S. Hamer TERMA AS	Date:	12th December 2008
Checked by:	A. Koppe		12.12.2008
Checked by:	J. Kroeker		12.12.2008
Product Assurance:	R. Stritter		13.12.08
Configuration Control:	W. Wietbrock		12/12/2008
Project Management:	W. Fricke		12/12/2008

Distribution: See Distribution List (last page)

Copying of this document, and giving it to others and the use or communication of the contents thereof, is forbidden without express authority. Offenders are liable to the payment of damages. All rights are reserved in the event of the grant of a patent or the registration of a utility model or design.

Issue	Date	Sheet	Description of Change	Release
1	05.12.08	All	Formal Issue	

Table of Content

List of Tables

1 Scope

This document reports on the SPIRE TBTV Functional Test in He2 conditions, performed in the frame of the HERSCHEL TB Hot Test Phase 10 (see test step TS#10a of AD 3), to verify proper instrument operation.

The test was executed with the S/C tilted at -20deg (20deg West in LSS nomenclature) and using the Herschel CCS & I-EGSE.

1.1 Objective

The objective of this TBTV Functional Test was:

- To check the correct full functional operation of the SPIRE FM (with the exception of the SMEC) under He2 and in Thermal Vacuum conditions on the nominal side only.

1.2 Test Flow

The TB/TV test is guided by the "Integrated Test Procedure for the HERSCHEL FM TB/TV Test", ref. HP-2-ASED-TP-0177, Issue 1.1 [AD3]. The instrument relevant parts are called up by procedure "HERSCHEL SAT and Instruments Procedure for the SAT TB/TV Testing", ref. HP-2-ASED-TP-0236, Issue 1.0 [AD4], which than addresses the applicable instrument functional procedure " TBTV SPIRE Functional Test Procedure", ref. HP-2-ASED-TP-0248, Issue 2 , [AD2] for SPIRE. Since the TB/TV test has been started with the SPIRE Redundant instrument in REDY mode at the end of Phase 5, the instrument needed to be switched off prior to switching on in Main instrument configuration according to AD2. On completion of the test SPIRE was left in REDY mode in Main configuration..

The Test flow in Phase 10 of the TB Hot/SPIRE TBTV Functional test was as follows (including PVS):

1. Power off SPIRE from Redundant TV REDY mode as per AD 2 (PVS #C136), chapter 7.30
2. Configure SPIRE I-EGSE for test, chapters 7.0, 7.1
3. Power on SPIRE Main for TBTV Functional as per AD 2, chapter 7.2
4. Manual Cooler Recycle, chapter 7.3
5. Switch from REDY to PHOTSTBY (NCR4698), chapter 7.4
6. PVS# C150, C151 (NCR4699), C152
7. Photometer Bias Phase Optimisation, PVS# C152, C153 (NCR4692), chapter 7.5

8. Photometer Bias Phase Characterisation with PCAL Flashes, PVS# C155, C156, chapter 7.6
9. Photometer Bias Noise Optimisation, PVS# C155, C158, chapter 7.7
10. Photometer Ambient Background Verification, chapter 7.8
11. PCAL Photometer Photometric Characterisation, PVS# C155, chapter 7.9
12. Photometer Chop/Jiggle Mode POF2, chapter 7.11
13. PVS# C159, C157
14. Photometer Thermal Control (PTC) Verification (NCR4725), PVS# C160, C137, C161, chapter 7.15
15. Switch from PHOTSTBY to REDY, chapter 7.16
16. Switch from REDY to SPECTBY (NCRs 4701/4707, 4704, 4703, 4705), chapter 7.17
17. PVS# C163, C164, C165
18. Automatic Cooler Recycle (instead of Manual) - PVS# C157
19. PVS# C167, C169, C170, C171
20. Spectrometer Bias Phase Optimisation, chapter 7.18
21. Spectrometer Bias Phase Characterisation with PCAL Flashes, chapter 7.19
22. Spectrometer Bias Noise Optimisation, chapter 7.20
23. Level 1 Herschel Spire Interface Test – High Resolution Mode Simulation, chapter 7.21
24. PVS# C174
25. Level 1 Herschel Spire Interface Test – Constant SMEC Power, chapter 7.22
26. Spectrometer Ambient Background Verification, chapter 7.23
27. PCAL Spectrometer Photometric Characterisation, PVS# C155, C176, C177, chapter 7.24
28. PVS# C173, Switch from SPECSTBY to REDY, chapter 7.26
29. PVS# C168, C178, C179, C180, C182, C183
30. PVS# C193: Switch off SPIRE Cooler Heat Pump Switch (manual command as 300mK Stage Decontamination not performed)
31. Power off SPIRE Prime prior to Phase 14t SPIRE Hot SFT (not yet performed – done prior to Phase 14 SPIRE SFT), chapter 7.28

Test Steps Not Performed

Due to time constraints the following test steps were not performed:

- SCAL Photometric Verification, chapter 7.25
- 300mK Stage Decontamination, chapter 7.27

The following step was replaced:

- Manual Cooler Recycle (Chapters 7.12, 7.13, 7.14) replaced by automatic Cooler Recycle PVS# C157

1.3 Procedure Execution Summary:

This test has been run with the HERSCHEL S/C tilted at -20deg (20deg West in LSS nomenclature) and on SPIRE nominal and redundant side. The as-run procedure is attached to this document as ANNEX 1.

The temperatures, seen during the SPIRE TVTB Phase 10, are shown in ANNEX 2.

The test duration of the SPIRE Phase 10 Test was ~ 49.5 hours including hold period for TB Hot.

Location: ESTEC, Noordwijk, NL
LSS, TV Chamber

Date Time: 29/11/2008 06:00 UTC – 01/12/2008 07:30* UTC

* SPIRE Cooler Pump Heat Switch switched off at 12:02 on the1/12/2008

* SPIRE switched off from Nominal REDY mode on 11/12/2008 at 05:26 in Phase 14 as Part of PVS# C273

Test Session Name:

2008_11_29_03_51_hercdmu_hpws23_REALTIME_TBTVTPA10

2008_11_30_07_32_hercdmu_hpws23_REALTIME_TBTVTP10b

HP CCS Environment: HP_2_ASED _TP_236_TBTV_END_002

OBSW: CDMS 3.6.2.6, ACMS 4.0, SPIRE DPU 3.0.B

HPSDB: HP-ASP-LI-1441_26

HPCCS Release: HPCCS Release_2.0-1317

Procedure variations are recorded in the Procedure Variation Summary in § 3.12 for the corresponding “as-run” procedure in Appendix 1 to this report:

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

The following observations were made during the test (extract from AIT Logbook):

Start 03:51 Finish 04:30	**Start new session: 2008_11_29_03_51_hercdmu_hpws23_REALTIME_TBTVTPA10 Tag: HP_2_ASED_TP_0236_TBTV_END_002 (Log Sheet Filled-out)**		
04:36	Time Synchro carried out - successfully	Synchronization is good.	
Start of Phase 10, SPIRE Test and TB Hot			
	ITP1.7, TP-G-SPIRE TV and SVM TB HOT TP-0236, Chapter 8.10, Phase 10 – SPIRE TEST and TB HOT		
	Handover to Early Shift		
05:28	Swap SPIRE Redundant to Nominal		PVS#C136 TP-0250
05:48	SPIRE mode incorrect. Reoccurrence of NCR when switching off SPIRE Redundant		Reoccurrence of NCR4639
06:16	2 TC cmd failures 2x SCR01500 Clear_HK_Report	As expected	
06:27	TC cmd failures SCR01500 Clear_HK_Report	As expected due to PVS C136 as process	
06:37	Load SVM TCS TCT table 5		PVS#C138 TP-0177
06:42	Note to ref TP-G-2 3b of TP-0177 HIFI is normal mode with LSU ON		
06:45	5-4 Event Class A Thermistor failure		
06:46	5-4 Event Class A Thermistor failure		NCR 4697
06:47	5-4 Event Class A Thermistor failure		

06:48	5-4 Event Class A Thermistor failure	ADDENDUM: 10:52 After the TCT upload the earlier made patched where discarded (See ORS 90). For now The temperature came to the nominal range causing the event to disappear. When the event return LSS as asked to have ORS 49 to be re-runned	
	Being reported every minute		
06:55	Start step 385 of TP-0236 calling TP-0248 SPIRE TBTV procedure		
07:00	Spire require additional manual scripts to be performed		PVS#C148 TP-0248
07:00	In parallel continue with RWL phase 10a stuff of TP-0236 steps 372 to 384		
07:51	Step 380 of TP-0236 RWL not reaching set momentum		PVS#C149 TP-0236
08:50	Switch on TTC chain 1 as per PVS & ORS 101	As requested by thermal engineers	
08:56	Disable FDIR for Helix current using manual cmd stack as per PVS	Because Tx1 will be switched off to prevent rf cable heat-up	ORS101
09:00	Switch on STR2		PVS#C138
09:08	Cmd Failure AC301109 TC32H OPS AIT 1	Expected, pkt already defined	TP-0236
09:12	Perform IST_status for TBTV phase 10		
09:18	SPIRE from REDY to PHOTSTBY	SPIRE went to PHOTSTBY how ever the offsets have not been applied correctly. Reset offsets and reapply.	NCR4698 PVS#C150 TP-0248
10:18	Performed ORS 100 to reset TMTC DFE	Connection test successful	ORS100
10:42	Switch on HIFI LOU heater	Current increase seen	PVS#151 TP-0248
	Spire test Script contains an invalid param name SPIRE-IST-STOP-DCU-DATA	SPR 1053 raised to load the new script once delivered	NCR4699
11:07	Perform SPIRE PCAL Flash		PVS#152 TP-0248

11:10	SPIRE IST-PHASEUP-PHOT70 terminated on CCS before any uplink commanding without error message.Log file however reported Same problem as seen with HIFI	Repeat test, test completed OK	Reoccurrence of NCR4692 PVS#153 TP-0248
13:09	Patching RWL speed limits to stop overflow of warning messages	Limit set to -225 to +225	PVS#154 TP-0236
13:45	Battery WMB04568 OOL LOW LOW		
13:46	Battery WMB02568 OOL LOW LOW		
14:00	Handover to late team		
14:05	PVS C155 raised to collect typos found in TP-0248 iss2		PVS#C155 TP-0248
14:09	Operator error, wrong script executed, ref. TP-0248 section 7.6 step 2, script sent was SPIRE_IST_PHASEUP_PHOT130	PVS#C156 raised to correct	
15:09	PVS#C156 executed to correct operator error		PVS#C156 TP-0248
15:37	NRB for NCR 4181 called during script run (expected to run 40 mins)	TP-0248 Step 2 page 47	
15:43	Battery WMB04568, WMB02568 OOL LOW LOW		
15:51	Battery WMB01568, WMB03568 OOL LOW LOW		
16:25	HPS status in TCS Interface does not agree with that in MIM: Heaters		New SPR ?
16:29:31	Four (5,1) events occurred: PACS_EVENT_REPORT_3_19 PACS_EVENT_REPORT_3_19 PACS_EVENT_REPORT_2_18 PACS_EVENT_REPORT_2_18		
17:14	PVS#158 executed to correct operator error		PVS#C158 TP-0248
17:20	Stared SPIRE-IST-DNA-PHOT-AMP50		
18:03	Started SPIRE-IST-DNS-PHOT		

18:12	Another 4 (5,1) event reported.		
18:41	Started SPIRE-IST-CPS-PHOT		
	Handover to night shift		
	Automatic cooler recycle.	PVS#C157 prepared. To be executed 30/11/08 at TP-0248 step 1 chapter 7.13.	PVS#C157 TP-0248
21:36	PVS #C159 executed	Additional step of SPIRE test (repetition of previous test)	PVS#C159 TP-0248
21:45	Skip recycle now, plus update PTC script		PVS#C160 TP-0248
21:50	Started SSMM dump, Packet store 0,1,2		
21:50	CdmuBsw Event 5-4 VC 1 Queue Full during packet store 2 dump.	PVS#C161 raised against PVS#C137	PVS#C161 PVS#C137
21:50	TP-0248, Chapter 7.15	There should be real-time science data, but SPIRE only see housekeeping. After approx 1 minute, science data became available.	
22:00	SSMM dump stopped due to problems (event 5-4 VC 1 queue full)		
22:16	PTC Heater switched OFF		
22:17	Run step 4 of 7.15, SPIRE_IST_END_TEST	End script run	
22:18	Re-run step 1, of 7.15, IST Start Test executed.		
22:20	After PTC Heaters turned OFF, SPIRE waiting for detectors to settle down		
	Check-in of tcl script doesn't work; starting CCS analysis session doesn't work.	A CVS error is received that is related to a Lock Timeout.	NCR#4702
22:31	Update SPIRE-IST_PTC_UM_PSWT1 + online patch		
22:33	Run SPIRE-IST_PTC_UM_PSWT1 + online patch		
23:00	PTC Heater switched OFF.		
23:01	SPIRE_IST_END_TEST	End script run	
23:15	SPIRE_IST_START_TEST	Start script run	
23:18	Step 2.2 of 7.15, SPIRE_IST_PTC-VM-SUBKTEMP		

23:32	Battery 1 alarm occurred		
23:39	Battery 3 alarm occurred		
23:40	Battery 1 alarm occurred		
23:42	SPIRE_IST_PTC-VN-SUBKTEMP test complete.		
23:43	PTC Heater switched OFF.		
23:43	SPIRE_IST_END_TEST	End script run	
23:44	After PTC Heaters turned OFF, SPIRE waiting for detectors to settle down		
23:57	SPIRE_IST_START_TEST	Start script run	
23:58	Repeat the first test, but using a different set-point. SPIRE_IST_PTC-VM-TC2	Set point decimal 51500 (hex 0XC92C)	
Sunday November 30th			
00:33	Test ended (SPIRE_IST_PTC-VM-TC2)		
00:34	PTC Heater switched OFF.		
00:34	SPIRE_IST_END_TEST	End script run	
00:35	7.16, Step 1	Fot Stby to Ready	
00:37	7.16, Step 2	In Ready Mode	
00:39	7.17, Step 1	Ready to Spec STBY	
00:41	7.17, Step 2	BSM-INIT	
00:42	3 OOL alarms received: SML3V510, SML43510, SML53510	Parameters OOL for 1 second	NCR#4704
00:44	1-off OOL received: 1M515	The value of the parameter is: OPENFEEDCBMEF (this OOL is continuous)	NCR#4703
00:47	SPIRE-IST-RESET-SPEC-OFFSETS	Spec Offsets Reset	PVS#C162 TP-0248
00:47	SPIRE report some anomaly with their detector array, approx 50% of their detectors are not enabled. (JFET's are not switching-ON)	SPIRE are investigating this anomaly before they can start any more of their tests.	NCR#4705
01:23	Power dissipation script run	W202584SPVT1016_POWER_DISSAPATION	PVS#C163 TP-0248
01:27	Battery 4 alarm occurred		
01:28	Battery 2 alarm occurred		

01:34	Battery 3 alarm occurred		
01:35	Battery 1 alarm occurred		
01:55	Investigate Spectroscopy Detector problem		PVS#C164 TP-0248
02:13	SPIRE_IST_COLD_SPEC_VSS	Script is run to check at what level the detector JFET's turn ON, the suspicion being the JFET's are too cold to turn on reliably. The test was NOT successful, they could not turn the JFET's ON.	
02:54 02:58	SPIRE-IST-SPT-SDET-OFF SPIRE-IST-SPT-BSM-OFF	PVS#C165 executed "Return to REDY mode after SPEC issue"	PVS#C165 TP-0248
03:00	Execute Automatic Cooler Recycle	Thermal Engineer informed.	PVS#C157 TP-0248
03:07	Started SSMM dump, Packet store 2, 3, 80, 81, 82		
	Restart Downlink Packet Store during SPIRE cooler recycling.		PVS#C166 TP-0248
	Handover to Early Shift Current position in procedures: Dump packet store ongoing Cooler recycling (automatic) ongoing On completion of these activities, we go back to SPIRE photometry	TP-0248, chapter 7.13 ITP-0177, TP-G-SPIRE TV & SVM TB HOT, step 7 (page 1.7-2)	
05:29	Started SSMM dump, Packet store 1 & 83		
06:27	CEL A & CEL B not dumped, continuing SPIRE		
06:52	Restart SPIRE Spectrometer tests at Section 7.17 of TP-0248		PVS#C167 TP-0248
06:56	Whilst running SPIRE-IST-SPT-BSM-INIT script hung, packets too old	Repeat test script, again script hung at same place. Will have to split session	Re-occurrence of NCR4181 PVS#C169 TP-0248
07:21	Batteries again		
	CEL A & CEL B dumped prior session split		

	No EGSE Support so the TAG is not updated going with old tag		
Start xxxx Finish xxxx	**Start new session: 2008_11_30_07_32_hercdmu_hpws23_REALTIME_TBTVTP10b Tag: HP_2_ASED_TP_0236_TBTV_END_002 (Log Sheet Filled-out)**		
07:42	Batteries again		
07:58	Continue transition SPIRE Spectrometry Standby	NB: SPIRE-IST-SPT-BSM-INIT again worked without SPIRE_ALL_SubscribeParams running!!!! However Subscribe script was then restarted for remainder of session	
08:05	1 Hard OOL reported for SPIRE SMEC SMS1M515 value OPENFEEDCBEMF	RAL (SPIRE) Report this as nominal for the current configuration.	Re-occurrence of NCR4703
08:14	Still problems with switching on the JFETs for SPIRE		
	On line patch performed for a New Additional test Script for SPIRE TBTV Photometer test SPIRE_IST_BSM_PCALFLASH		SPR1055
08:52	Terminate SPIRE test SPIRE-IST-COLD-SPEC-VSS-p as Offsets have not been applied first		PVS#C167 TP-0248
09:28	Batteries again		
09:35	Critical Param check failure Synrco with SC is negative = -0.007757333333333333333		
09:36	Critical Param check failure Synrco with SC is negative = -0.007757333333333333333		
09:37	Critical Param check failure Synrco with SC is negative = -0.007757333333333333333		

09:38	Critical Param check failure Synrco with SC is negative = -0.0106573333333		
09:42	Critical Param check failure Synrco with SC is negative = -0.0135703333333		
10:46	Restart of SPIRE testing NCR 4705 investigation Spectrometer JFET investigation		PVS#C170 TP-0248
10:49	IFMGRconn timeout occurred dropping connection to SCOE TMTCDFE	Immediate reconnection performed for the DFE. Connection OK. Lost TM for 30 secs.	NCR 4708
10:56	Several OOL warnings for SPIRE temps SMFBK520, SMF7k520, SMF8K520, SMF3K520, SMFAK520, SMF9K520, SMFCK520, SMF4k520, SMF2K520,	These have reappeared due to reconnecting the DFE, These were seen previously.	NCR 4707
11:15 11:21	Still some JFET Problems on Spire Switch On the JFET Heaters again and as soon as they were on the JFETS closed Reset the SPEC Offsets: SPIRE-IST-SPEC-RESET-OFFSETS		PVS#C171 TP-0248
11:36	Resuming TP-0248 Sect 7.18 at page 65: Run Script: SPIRE-IST-PHASEUP-SPEC80		
12:50	Air-Conditioner de-iced		
13:24	Battery temp OOL		
15:12	Battery temp OOL		
15:20	Battery temp OOL		

16:00	Handover to late + night shift crew	WARNING: always inform the Thermal Team before any SPIRE mode change. PVS#C173 to be run prior to TP-0248 section 7.26 PVS#C168 to be run after TP-0248 section 7.26	
17:21	PVS#C174 issued and run, for an extra step after SMEC test	Requested by SPIRE	PVS#C174 TP-0248
17:37	TP-0248 section 7.22 step 1 executed	Level 1 SPIRE interface test – constant SMEC power. Current SPIRE mode is: Spectroscopy	
17:45	Thermal guys providing list of missing heater parameters in TCS log, for investigation	Not related to step running now, TCS log script problem	SPR#1057 raised
18:39	Test floor reporting drop of Optical Bench temperatures at 17:15 and rise at 17:38	SPIRE contacted, this is normal, in accordance with SMEC allowed to cool down a bit just before going to constant SMEC power at 17:37	
19:18	TCS log script corrected and tested with PVS#C175	From now on, missing data now available to Thermal Team in LSS	PVS#C175 SPR#1057 closed
19:26	TP-0248 section 7.23 step 1 executed SPIRE_IST_CPS_SPEC		
	Handover to night shift crew		
19:47	TP-0248, section. 7.23, Step 2 executed SPIRE_IST_LC_SPEC		
20:23	TP-0248, section. 7.23, Step 3 executed SPIRE_IST_CPS_SPEC		
	SPIRE not configured correctly, the above tests in section 7.23 are to be re-run, but in a different order.	Repeat Spectrometer Ambient Background Verification.	PVS#C176 TP-0248
20:48	SPIRE_IST_DNS_SPEC		
20:50	SPIRE_IST_CPS_SPEC		
20:55	SPIRE_IST_LC_SPEC	Script aborted at 20:58 before ending.	

21:01	SPIRE_IST_DNS_SPEC	IST_DNS SPEC repeated again, (it did not work the first time)	
21;05	Battery 1 alarm occurred		
21:14	Battery 1 alarm occurred		
21:16	SPIRE_IST_RESET_SPEC_OFFSET		
21:18	SPIRE_IST_CPS_SPEC		
21:22	SPIRE_IST_LC_SPEC		
21:54	A setting in the SPIRE script was specified incorrectly the test was run with the wrong phase settings again		PVS#C176 TP-0248
21:55	SPIRE_IST_DNS_SPEC		
21:57	SPIRE_IST_RESET_SPEC_OFFSET		
21:59	SPIRE_IST_LC_SPEC		
22:27	SPIRE_IST_CPS_SPEC		
22:30	Test Floor report that T248 has risen by 0.35K		
22:31	SPIRE_IST_PCALON_LC_SPEC		
22:39:53	Many commands on CCS side have failed, a problem on the ground segment. The complete data front-end has stopped.	Script terminated. The link between the interface and the front-end has failed.	
22:44	CCS re-connected.		
22:45	SPIRE do not receive TM, not even housekeeping.		
22:47	CCS is receiving housekeeping from SPIRE		
22:48	SPIRE still do not receive TM, not even housekeeping.		
22:49	Checkout do not have science data		PVS#C177
22:50	Connection dropped/re-established to SPIRE	Successful connection	TP-0248
22:51	Checkout only have data from SCOE's, no 1282 data (SPIRE)		NCR#4709
22:53	TM/TC DFE Pipe Interface re-started		
22:54	Connection dropped/re-established to SPIRE	Successful connection	
22:54	Checkout CCS does have data back again, but SPIRE have not.		
22:55	ACMS alarm, many 5-4 critical events, 2018 data has ceased	M.Theunissen contacted for support.	
23:02	Connection test works, we have telemetry		
23:03	SPIRE are receiving TM, some housekeeping.		

23:04	Checkout CCS receiving Nominal & Critical alarms		
23:05	Hpws21 & 23 not sounding alarms		
23:06	Connection with S/C now seems to be stable	We are only receiving warnings, no critical alarms	
23:06	It was noticed that the CCS Lite has disconnected from the data front end. This was re-connected.		
23:16	TMTC DFE re-started		
23:20	The problems experienced above are considered to be due to a time synchronization problem between the SCOE's.		
	Continuing with SPIRE TBTV Tests		
23:20	SPIRE_IST_START_SPEC_DATA		
23:26	SPIRE_IST_PCALON_LC_SPEC		
Monday December 1st			
00:02	Switch OFF Spectrometer JFET Heaters	Section 7.26.	PVS#C173 TP-0248
00:10	SPIRE_IST_SPT_BSM_ON		
00:12	SPIRE_IST_SPT_BSM_INIT		
00.13	SPIRE_IST_SPT_PDET_ON		PVS#C168 TP-0248
00:14	3 OOL alarms received: SML3V510, SML43510, SML53510	Re-occurrence NCR#4704	
00:17	SPIRE_IST_RESET_PHOT_OFFSETS		
00:18	SPIRE_IST_BSM_PCALFLASH		
00:44	SPIRE_IST_CPS_PHOT		PVS#C178 TP-0248
00:48	SPIRE_IST_START_TEST		
00:50	SPIRE_IST_PTC_VM_TC2		
01:01	Battery 1 alarm occurred		
01:09	Battery 3 alarm occurred		
01:10	Battery 1 alarm occurred		
01:46	Hpws23 workstation, lost AC mains power. (operator error) AC power restored & workstation booted.	Recovery after loss of hpws23	PVS#C179 TP-0248

01:56	SPIRE have completed their analysis test and request we stop the VM		
01:59	HALT_VM1	Successful completion of command received	
02:03	SPIRE_IST_END_TEST		
02:04	SPIRE_IST_START_TEST		
02:07	SPIRE_IST_PTC_SUBKTEMP		
02:09	Communication with Test Floor, they confirm that the SPIRE tests ongoing for the last 2 hours have had no affect on temperatures.		PVS#C178 TP-0248
02:57	Battery 4 alarm occurred		
03:00	SPIRE_IST_END_TEST		
	Wait period to let SUBKTEMP to settle down		
03:05	Battery 4 alarm occurred		
03:06	Battery 1 alarm occurred		
03:08	Communication from SPIRE, SUBKTEMP has settled down		
03:09	SSMM CORR Error received.		
03:12	SPIRE_IST_START_TEST		
03:16	SPIRE_IST_PTC_VM_SUBKTEMP		
04:04	HALT_VM1		PVS#C178 TP-0248
04:04	PTC Heater switched OFF.		
04:06	SPIRE_IST_END_TEST		
04:12	SPIRE_IST_START_TEST		
04:19	SPIRE_IST_PTC_VM_PSWT1		
	Note – The CCS is becoming SSLOWW, it takes a very long time (3 mins) to check-in a script.		
04:20	IST_DUMP_PKT_STORE (Store 0 & 1)	PVS#C180, Manual SSMM dump in parallel of instrument test.	PVS#C180 TP-0236
04:23:35	TM Buffer is full, cannot process telemetry from SCOE, ACMSSCOE	Postpone all the remainder of the Dump	
	Continuing with SPIRE_IST_PTC_VM_PSWT1		PVS#C178 TP-0248
05:30	Handover to Early Shift	Currently at TP-0236, step 385	

06:50	2 battery OOL's (9.92 degr C i.s.o. 10 degr. C. on lower limit)	WMB 02568 & 04568	
06:58	And now WMB03568 has joined the previous two		
06:58	And finally WMB01568 has joined the previous three		
07:12	Perform Power Dissipation script on request of test-director		PVS#C0182 TP-0177
07:18	Finished SPIRE_IST_PTC_VM_PSWT1 on request of SPIRE		
07:22	End of phase TS#10c hot DTCP	… as we found out via the CIS again and asked the test-director for confirmation	
07:24	Completing PVS#C168 at the end of section 7.26		PVS#C0183 TP-0248
07:30	SPIRE in REDY mode	TP-0236, Steps 385 & 386 finished	
07:39	Execute ORS#108 to set some Thresholds	By mistake it was first set for class B i.s.o. class A ; This was corrected by re-applying the settings for the correct Class; no impact.	ORS#108/ PVS#C184
07:53	Workstation HPWS23 just froze-up …..	Rebooted the workstation by switch off/on via power button	
08:05	Execute ORS#109 to set some Thresholds		ORS#108/ PVS#C185
09:48	ACMS to SAM to restart piped application (finished)		PVS#C0188 TP-0236
Start: 08:05 End: 10:35	Perform SSMM dump manually i.a.w. PVS	This is performed parallel to the HIFI units warm-up CEL's dumped and reset as well Note: Packet store 83 was skipped for the moment due to time constraints (packet store 03 took a long time, very large file !!)	PVS#C0180 TP-0177
10:29	Verify status of dump of packets stores	It takes really long to download the data so we just check	PVS#C194 TP-0236
End of Phase 10, SPIRE Test and TB Hot			
10:53	Session split on TMTC-DFE	Done by EGSE operator (LA)	

Start 10:52 Finish 11:36	**Start new session: 2008_12_01_11_06_hercdmu_hpws23_REALTIME_TBTVTP11a Tag: HP_2_ASED_TP_0236_TBTV_END (Log Sheet Filled-out, SSMM dump skipped since already done just before)**		
Start of Phase 11, HIFI Test 3			
11:45	Switch-off SPIRE sorption Cooler heat pump	Run twice due to using wrong command parameter the first time	PVS#C0193 TP0248

Table 1: SPIRE TVTB Test Summary

2 Documents/Drawings

2.1 Applicable Documents

AD1	SPIRE FM Short Functional Test (Warm or Cold)	HP-2-ASED-TP-0212, Issue 2
AD2	TBTV SPIRE Functional Test Procedure	HP-2-ASED-TP-0248, Issue 2
AD3	Integrated Test Procedure for the HERSCHEL FM TB/TV Test	HP-2-ASED-TP-0177, Issue 1.1
AD4	HERSCHEL SAT and Instruments Procedure for the SAT TB/TV Testing	HP-2-ASED-TP-0236, Issue 1.0

2.2 Reference Documents

None

2.3 Other Documents

None

2.4 Acronyms & Abbreviations

See “as-run” procedure.

3 Main Observations and Problems Identified.

The following SPIRE related NCRs were raised during the SPIRE TBTV Phase 10 functional test:

3.1 NCR-4698: TBTV: SPIRE transition REDY to PHOTSTBY, offset were not applied correctly

To be investigated by RAL.

3.2 NCR-4699: TBTV: Invalid param name in a SPIRE TBTV test script

Fixed on line by script update & validated. SPR 1053. Does not affect flight procedures.

To be closed.

3.3 NCR-4692: TBTV - HIFI Script failed due to command mismatch

Re-occurrence of an NCR raised during HIFI testing. Test sequence was re-executed without problem.

3.4 NCR-4701: TBTV - Out of limits during SPIRE TV test

L1 temperature too low during SPIRE test. Will be seen during SOVT. MIB to be updated. (but not many tests remaining).

3.5 NCR-4703: TBTV - SPIRE, Alarm parameter OPENFEEDCBMEF

Expected, as related to SMEC that is switched off. (alarm expected).

To be closed.

3.6 NCR-4704: TBTV - SPIRE 3 Out Of Limit alarms received.

The hard OOLs on SLIA voltages SLIAP5V, SLIAP9V and SLIAM9V were seen for 1 second at 00:42:35 on 30th Nov 2008. The checks that were performed to trigger these OOLs are identical to the ones for the PLIA voltages PLIAP5V, PLIAP9V and PLIAM9V. But when the PLIAs were switched on at 09:27:38 on 29th Nov 2008, no such hard OOLs were triggered.

It seems that a small delay is possible between the checking parameter becoming valid and the voltages reaching their nominal switch-on values. It can be fixed relatively easily in the MIB by increasing the number of consecutive violations before triggering the OOLs.

3.7 NCR-4705: TBTV SPIRE – detector problem in spectroscopy

Part of JFET on Spectrometer side does not start. Fixed by applying heat (25mW) on the JFET. May be linked to a local defect on the JFET (superconducting bridge). Heater may need to be used in flight. but power to be minimized. Follow on test is proposed to be added to SFT (SVM TV Hot Phase 14) to measure the minimum power required to keep JFETs ON.

3.8 NCR-4707 TBTV: Several OOL warnings for SPIRE temperatures

Recurrence of NCR-4701.

NCR closed.

3.9 NCR-4725 VC1 Overflow During SPIRE TV Hot

During section 7.15 / Step 2.2 Procedure: Photometer Thermal Control (PTC) Verification.

Science Packet & data rate on VC1 at this time to be investigated by RAL.

3.10 NCR-4457 SPIRE test script does not perform the correct operation

Fixed in the software. However this part of TBTV test skipped (section 7.25).

To be added to SFT. SPIRE to provide delta procedure and script for NCR closeout verification.

3.11 Procedure Changes

All procedure changes were identified by a corresponding PVS.

3.12 List of Procedure Variations

The following table lists the SPIRE related PVS raised during the test:

C136	TP-0236	Switch SPIREfrom redundant to nominal
C148	TP-0248	Logging of manual SPIRE events
C150	TP-0248	Change bias offsets for PHOTSTBY NCR 4698
C151	TP-0248	Switch on HIFI LOU HTR
C152	TP-0248	Perform Pcal flash
C153	TP-0248	NCR 4692 unexpected end of SPIRE TS
C154	TP-0236	Stop overflow of warning messages from RWLs
C155	TP-0248	Typos graphical corrections
C156	TP-0248	Wrong script executed
C157	TP-0248	Automatic cooler recycle
C158	TP-0248	Recover from wrong script
C159	TP-0248	Additional step of SPIRE test (repetition of previous step)
C160	TP-0248	Update PTV verif script + skip SPIRE cooler recycle
C161	PVS#C137	TM 5-4 event VC1 Queue full during packet store 2 dump
C162	TP-0248	Reset spectroscopy offsets
C163	TP-0248	Log the power dissipation on thermal expert request
C164	TP-0248	Investigate spectroscopy detector problem
C165	TP-0248	Return to REDY mode after spec issue
C166	TP-0248	Restart downlink packet store during SPIRE cooler recycle
C167	TP-0248	Restart spectrometer tests (SPIRE)
C168	TP-0248	Additional SPIRE photometer test
C169	TP-0248	Reoccurrence of NCR 4181 - split test session
C170	TP-0248	NCR 4705 spectrom JFET investigation
C171	TP-0248	NCR 4705 spectrom JFET autonomous switch off
C173	TP-0248	NCR 4705 switch off spectrometer JFET htrs
C174	TP-0248	Extra step after SMEC test
C176	TP-0248	Repeat spectrometer ambient background verification
C178	TP-0248	PTC tests ongoing TB HOT phase
C183	TP-0248	Skip test step 27 due to time constraints
C193	TP-0248	Switch off SPIRE SC heat pump
C282	TP-0248	SPIRE IEGSE Problem when switching off SPIRE nominal

4 Summary

SPIRE TVTB Phase 10 has been completed successfully, apart from two missing tests (Section 7.25 SCAL Photometric Verification and section 7.27 300mK Stage Decontamination).

After Manual cooler recycling (section 7.3) a hold time of about 18 hours was achieved before it was interrupted by the start of a second (automatic) cooler re-cycle. The hold time achieved for this second re-cycle was between 25 and 26 hours.

TB test equilibrium was been perturbed by the transition from photometer to spectrometer (27W difference), however this was re-established at the end of the SPIRE Spectrometer activities.

Two additional photometry tests were performed during the 2nd TB stabilisation:

- Calibration of BSM with Calibration source (PVS168), and
- Optimisation of the Detectors Temperature control (PVS178)

Cooler hold time was ~26 hrs with the prevailing test conditions.

For the missing tests SCAL does not need to be retested. However a subset of the test is required to enable closeout of NCR4457. The decontamination test is to be added if compatible with remainder of the TBTV schedule.

Additional heating power on JFET (25mW) was needed to be able to start the JFET (NC 4705), but with OBP colder than flight (6K). This power needs to be minimized by a short test on JFET heater. This test (1hr max) may be added to SPIRE Hot SFT.

4.1 Open Issues

- NCR-4705: JFET autonomous switch-off, minimum heater power investigation.
- NCR-4725: VC1 Overflow, investigation into root cause
- NCR-4457: Incorrect operation by script, closeout verification
- 300mK Decontamination – to be performed if time slot available

5 Appendix 1: TBTV SPIRE Functional Test Procedure

As-Run Procedure

(ref. HP-2-ASED-TP-0248, issue 2)

AS RUN COPY

TBTV TEST

PHASE 10 FT-RUN.
29/11-01/12/08.

Title:

TBTV

SPIRE Functional Test Procedure

CI-No: 125300

Prepared by	S. Hamer/ A. Polverini TERMA AS	Date:	13th November 2008
Checked by	A. Koppe		13.11.2008
AIT	R. Hohn		13.11.08
Engineering	J. Kroeker		14.11.2008
Product Assurance	R. Stritter		13.11.08
Configuration Control	W. Wietbrock		14.11.08
Project Management:	Dr. W. Fricke		14/11/2008
TAS-F	D. Montet		

Distribution: See Distribution List (last page)

Copying of this document, and giving it to others and the use or communication of the contents thereof, are forbidden without express authority. Offenders are liable to the payment of damages. All rights are reserved in the event of the grant of a patent or the registration of a utility model or design.

Issue	Date	Sheet	Description of Change	Release
1	06.11.08	All	Initial issue	
2	13.11.08	All	Correction of TBTV SPIRE WU Switch ON an Operating limits in sections 7.2 and 7.29 Typographical Bring step no.s in line with section no.s	

Table of Content

Table of Figures

List of Tables

1 Scope

1.1 Scope

This Test Procedure contains the step by step procedure for the SPIRE functional tests to be performed during TBTV in Helium II conditions (refs. AD1 and RD3). It includes initial configuration of the Instrument EGSE for the test as well as the TBTV specific power on/off procedure for both Nominal and Redundant SPIRE units.

The SPIRE SFT to be performed as part of TBTV is an existing separate standalone procedure detailed in AD5 and therefore not included herein.

The Spacecraft start-up configuration for the test and shutdown afterwards is covered by AD2.

The leading procedure also contains the definition of the relevant supporting infrastructure and pre test conditions required for the TBTV tests to be performed correctly. However, any specific supporting hardware or software required specifically for SPIRE is detailed within this procedure.

1.2 Objective

The objective of the SPIRE TBTV Test is the functional and to a certain extent performance verification of SPIRE in HeII conditions when in a flight representative Satellite configuration and environment.

1.3 Test Flow

This functional test flow is structured as follows:

DAY 1

1. Cooler recycle (manual) – ca. 2.5 hr
2. Stabilisation in PHOTSTBY – 1.25 hr
3. Photometer bias phase optimisation - ca. 4.0 hr
4. Shift Handover – ca. 1.0 hr
5. Photometer bias phase characterisation with PCAL Flashes - ca. 0.5 hr
6. Photometer bias noise optimisation - ca. 4.5 hr
7. Photometer Ambient Background Verification – ca. 1.0 hr
8. Shift Handover – ca. 1.0 hr
9. PCAL Photometer Photometric Characterisation – ca. 0.75 hr

10. Photometer chop/jiggle mode POF2 – ca. 1hr
11. Photometer chop/jiggle mode POF3 – ca. 1hr
12. Transition to REDY – ca. 0.25 hr
13. Shift Handover – ca. 1.25 hr

Duration Estimate for Day 1: 20.00 hrs

DAY 2

14. Cooler recycle (manual) – ca. 2.50 hr
15. Transition to PHOTSTBY – ca. 0.25 hr
16. Photometer Thermal Control (PTC) Verification – ca. 1.0 hr
17. Transition from PHOTSTBY to SPECSTBY via REDY – ca. 0.75 hr
18. Spectrometer bias phase optimisation – ca. 4.0 hr
19. Shift Handover – ca. 1.0 hr
20. Spectrometer bias phase characterisation with PCAL Flashes – ca. 0.5 hr
21. Spectrometer bias noise optimisation – ca. 4.5 hr
22. Level 1 Herschel-SPIRE Interface Test - High Resolution Mode Simulation – ca. 2.0 hr
23. Shift Handover – ca. 1.0 hr
24. Level 1 Herschel-SPIRE Interface Test - Constant SMEC Power – ca. 2.0 hr
25. Spectrometer Ambient Background Verification – ca. 0.75 hr
26. PCAL Spectrometer Photometric Characterisation – ca. 0.75 hr
27. SCAL Photometric Verification – ca. 3.0 hr
28. Transition to REDY – ca. 0.25 hr
29. 300 mK Stage Decontamination - ca. 3.0 hr

Duration Estimate for Day 2: 27.25 hrs

Total estimated duration: 47.25 hrs

NOTE: The estimated duration for executing the TB/TV sequence of procedures, excluding switch on/off of the SPIRE instrument is estimated to be about 48 hours in total.

Power ON/OFF of SPIRE is treated separately based on the needs of the Test Specification (AD 4) and controlled by Herschel EGSE SAT and Instruments Procedure for the SAT TB/TV Testing (AD 2).

SPIRE TV/TB Day 1: First half of main 48 hour section								
Step	**Test Name**	**Description/Purpose**	**Time Required / hh:mm**	**Start Mode**	**End Mode**	**Running Time / hours**	**Comments**	**Nom start time**
1	Test preparation	Get cryostat into correct state for SPIRE testing. Low drifts and cryocover <100 K.	00:00	REDY	REDY	00:00	What temperature is the lid at the start of the SPIRE shift? **It is planned to run a 30 hours hot SVM TB case for Herschel concurrently. We can recycle the cooler whenever it runs out though.**	07:00
2	Mode transitions	Prior to test SPIRE has been switched on and left in REDY mode.	00:30	REDY	REDY	00:30	Spare time to get in correct mode if not in REDY at start of 48 hours.	07:30
3	Cooler recycle (Manual)	Manual Cooler Recycle. Hold time is likely to be ~20 hours so cooler recycles repeated as necessary during day 1 and 2.	02:30	REDY	REDY	03:00		10:00
4	Switch to PHOT STBY	Switch the instrument on in photometer mode using ILT settings and Vss from CFT DCU-07P (SPT 2704_3.4 used)	00:15	REDY	PHOT STBY	03:15		10:15
5	Wait for stabilisation	Need to wait until 300 mK stage is drifting slowly enough to allow detector characterisation	01:00	PHOT STBY	PHOT STBY	04:15	Knowledge of the stabilisation times for the detectors is a HIGH priority for SPIRE. Gives baseline for instrument operating temperature with everything OFF.	11:15

SPIRE TV/TB Day 1: First half of main 48 hour section								
Step	**Test Name**	**Description/Purpose**	**Time Required / hh:mm**	**Start Mode**	**End Mode**	**Running Time / hours**	**Comments**	**Nom start time**
6	Photometer bias phase optimisation	Find the optimum bias phase versus frequency for operating the photometer under IST ground nominal conditions. UPDATE CUS PARAMETERS "detector nominal settings.txt"	04:00	PHOT STBY	PHOT STBY	08:15	Check the overall FPU transient behaviour without PTC control in flight like environment.	15:15
7	**SHIFT 1 CONTINGENCY**	**END OF SHIFT TIDY UP READY FOR HANDOVER.**	**01:00**			09:15	**This is where we change crew - we should assume that all has not gone to plan and some time is required to finish at a test boundary/ have handover meeting etc**	16:15
8	Photometer bias phase characterisation with PCAL Flash	PCAL Flashes throughout to check for He leaks onto BDAs. Load curves to check for straylight and the measure accurately the temperature of the BDAs. UPDATE CUS PARAMETERS "detector nominal settings.txt"	00:30	PHOT STBY	PHOT STBY	09:45		16:45
9	Photometer bias noise optimisation	Find the optimum bias level and frequency for operating the photometer under IST ground nominal conditions.	04:30	PHOT STBY	PHOT STBY	14:15		21:15

SPIRE TV/TB Day 1: First half of main 48 hour section								
Step	**Test Name**	**Description/Purpose**	**Time Required / hh:mm**	**Start Mode**	**End Mode**	**Running Time / hours**	**Comments**	**Nom start time**
10	Photometer Ambient Background Verification	Determine the optical power load onto the photometer detectors using a detector "loadcurve" at fixed frequency and phase to measure the detector temperature.	01:00	PHOT STBY	PHOT STBY	15:15	"load curve"	22:15
11	**SHIFT 2 CONTINGENCY**	**END OF SHIFT TIDY UP READY FOR OVERNIGHT.**	**01:00**			**16:15**		**23:15**
12	PCAL Photometer Photometric Characterisation	Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power	00:45	PHOT STBY	PHOT STBY	17:00	Must be done after Photometer bias optimisations. We have done during SPT so this is a thermal test.	00:00
13	Photometer chop/jiggle mode POF2	POF2 - See the thermal effects on the instrument of the heat flows from operating the photometer with the BSM chopping.	01:00	PHOT STBY	PHOT STBY	17:15		00:15
14	Photometer small map mode POF3	POF3 - See the thermal effects on the instrument of the heat flows from operating the photometer with the BSM chopping. Tests VM.	01:00	PHOT STBY	PHOT STBY	18:00		01:00

SPIRE TV/TB Day 1: First half of main 48 hour section								
Step	**Test Name**	**Description/Purpose**	**Time Required / hh:mm**	**Start Mode**	**End Mode**	**Running Time / hours**	**Comments**	**Nom start time**
15	Switch to REDY	For handover to day 2.	0:15	PHOT STBY	REDY	18:15		03:00
16	SHIFT 3 CONTINGENCY	END OF SHIFT TIDY UP READY FOR OVERNIGHT. UPDATE CUS PARAMETERS IF NECESSARY.	01:15			21:15	WE EXPECT COOLER HOLD TIME TO RUN OUT DURING SVM TB HOT CASE ABOUT NOW. NO LONG TESTS HERE.	04:15

SPIRE TV/TB Day 2 second half of main 48 hour section								
17	Test preparation	Make sure cryostat is still in correct state for continuation of SPIRE testing. Low drifts and cryocover <100 K. No time allocated as hopefully should continue from yesterday.	00:00	REDY	REDY	21:15		04:15
18	Manual Cooler Recycle. The order may change depending on the hold time from the first recycle.	A second manual cooler recycle will be required after the first hold time finishes. Test new PTC control VM after second cooler recycle.	02:30	REDY	REDY	23:45		06:45
19	Switch from REDY to PHOT STBY	Switch the instrument on in photometer mode using ILT settings and Vss from CFT DCU-07P	00:15	REDY	PHOT STBY	24:00		07:00

SPIRE TV/TB Day 2 second half of main 48 hour section								
20	Photometer Thermal Control (PTC) Verification	To test detector thermal stability whilst under PTC control – this can be carried out at any point	01:00	PHOT STBY	PHOT STBY	25:00		08:00
21	Switch from PHOT STBY to REDY	PJETs and photometer detectors off.	00:15	PHOT STBY	REDY	25:15		08:15
22	Switch to SPEC STBY	Switch to SPEC STBY	00:30	REDY	SPEC STBY	25:45		08:45
23	Spectrometer bias phase optimization	Spectrometer bias phase optimization. UPDATE CUS PARAMETERS AFTER	04:00	SPEC STBY	SPEC STBY	29:45		12:45
24	**SHIFT 1 CONTINGENCY**	**END OF SHIFT TIDY UP READY FOR HANDOVER. HANDOVER DURING STEP 22.**	**01:00**			30:45		13:45
25	Spectrometer bias phase characterisation with PCAL Flashes	Spectrometer bias phase characterisation with PCAL Flashes. UPDATE CUS PARAMETERS AFTER.	00:30	SPEC STBY	SPEC STBY	31:15		14:15
26	Spectrometer bias noise optimisation	Spectrometer bias noise optimisation. UPDATE CUS PARAMETERS AFTER.	04:30	SPEC STBY	SPEC STBY	35:45		18:45
27	Level 1 Herschel-SPIRE Interface Test - High Resolution Mode Simulation	High Resolution Scan - SOF1 emulation - Variable SMEC encoder power	02:00	SPEC STBY	SPEC STBY	37:45	New test. Duration TBD	20:45

SPIRE TV/TB Day 2 second half of main 48 hour section								
28	**SHIFT 2 CONTINGENCY**	**END OF SHIFT TIDY UP READY FOR OVERNIGHT**	**01:00**			38:45		21:45
29	Level 1 Herschel-SPIRE Interface Test - Constant SMEC Power	Constant SMEC encoder power - L1 interface test	02:00	SPEC STBY	SPEC STBY	40:45	New test. Duration TBD	23:45
30	Spectrometer Ambient Background Verification	Spectrometer Ambient Background Verification	00:45	SPEC STBY	SPEC STBY	41:30	"load curve"	00:30
31	PCAL Spectrometer Photometric Characterisation	Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power	00:45	SPEC STBY	SPEC STBY	42:15	Must be done after spectrometer bias optimisations. **Does PCAL flash affect the mode?**	01:15
32	SCAL Photometric Verification	See thermal effects on Instrument from spectrometer calibration source 1st SCAL 2 (2nd SCAL 4 - not likely to have enough time)	03:00	SPEC STBY	SPEC STBY	45:15	Must be done after spectrometer bias optimisations. SCAL4 could be cut if running out of time.	04:15
33	Switch from SPEC STBY to REDY	Switch to REDY	00:15	SPEC STBY	REDY	45:30		04:30
34	300 mK Stage Decontamination	To remove any traces of Helium deposited over the 300 mK stage during the SPT testing.	03:00	REDY	REDY	48:30	Duration 2-4 hrs	07:30

SPIRE TV/TB Day 2 second half of main 48 hour section								
35	Switch SPIRE OFF	Switch the instrument off and on to the next instrument/test section.	00:30	REDY	OFF	49:00	The extent of the cooler hold-time is of major interest so leaving it for as long as possible is a HIGH priority for SPIRE. • THIS SHOULD BE LAST TEST TO BE RUN BEFORE THE END OF TV/TB	08:00
36	**SHIFT 3CONTINGENCY**	**END OF SHIFT TIDY UP READY FOR OVERNIGHT**	**01:00**			50:00		09:00
37	Overnight Hold on Test Activities/ Swap to next instrument's test sequence		01:30			51:30	IF COOLER HOLD TIME IS <24 HOURS THEN MIGHT NEED 3 HOURS MORE.	10:30

2 Documents/Drawings

This document incorporates, by dated or undated references, provisions from other publications. These normative references are cited at appropriate places in the text and publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these apply to this document only when incorporated into it by amendment or revision. For undated references, the latest edition of the publication referred to apply.

2.1 Applicable Documents

Id	Title	Number	Issue
AD 1	Test Specification for Herschel Instruments FM tests performed at Satellite Level	H-P-2-ASP-TS-1083	2
AD 2	Herschel EGSE SAT and Instruments Procedure for the SAT TB/TV Testing	HP-2-ASED-TP-0236	
AD 3	SPIRE I-EGSE Set-Up	SPIRE-RAL-DOC-002841	2.1
AD 4	HERSCHEL FM TV/TB TEST SPECIFICATION	H-P-2-ASP-TS-0997	
AD 5	SPIRE FM Short Functional Test (Warm or Cold)	HP-2-ASED-TP-0212	1.3
AD 6	Herschel FM Thermal Test Leading Procedure	HP-2-ASED-TP-0200	
AD 7	Integrated Test Procedure for Herschel FM TB/TV	HP-2-ASED-TP-0177	
AD 8	Herschel PA Plan	HP-2-ASED-PL-0007	
AD 9	IID-A	SCT-PT-IIDA-04624	4
AD 10	S/C Configuration for IST Instrument Commissioning	HP-2-ASED-TP-0237	1

2.2 Reference Documents

Id	Title	Number	Issue
RD 1	SPIRE Instrument User Manual	SPIRE-RAL-PRJ-002395	1.4
RD 2	SPIRE IID-B	SCI-PT-IIDB/SPIRE-02124	
RD 3	SPIRE IST Thermal Vacuum/Balance Test Procedures	SPIRE-RAL-PRC-3042	1.7
RD 4	Herschel Planck Central Checkout System User Manual	H-P-4-TE-MA-0010	

2.3 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
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 Requirements to be verified

This test is primarily a full functional test of the SPIRE instrument integrated in the spacecraft.

The related pass/fail criteria is to compare for each test step the actual (achieved) results with the nominal (expected) results, as defined in section 7 (step-by-step procedure).

The real time analysis of the acquired science data concerning performance aspects will be done by RAL using separate procedures and tools (e. g. on the IEGSE).

Also the evaluation of the scientific data and reporting of the evaluation results will be done by RAL. RAL will finally assess the achieved performance versus the requirements.

Typically, the Post Test Review (PTR) will be held before completion of scientific data evaluation and therefore only a preliminary assessment of the test success can be made at the PTR.

The test is considered as preliminarily successful if all test steps defined in section 7 reveal compliant results, if all commands have been successfully executed and the housekeeping data have not indicated any anomalies or faults and the science data could be correctly downloaded and the real time analysis (by RAL) have not revealed any degradation of the instrument performance.

The final conclusion of the test will be drawn after the completion of the post processing of the SPIRE science data and comparing the results with the test predictions.

Specific requirements verified by the test are addressed in the top level TBTV Procedure (AD 6).

4 Configuration and Set-up

4.1 Configuration

4.1.1 Hardware

Ref. AD2

4.1.2 Software

The actual software versions to be used for the test shall be identified at the TRR and documented in the minutes of meeting of the TRR.

4.1.3 Test software

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

The following ASED Power ON/OFF test scripts are required for execution of the test:

Number	Tcl Script Name	Comment
1.	S102999SCVT027_ASDSPTSPIR_PWR_ON_P	
2.	S102999SCVT028_ASDSPTSPIR_PWR_OFF_P	
3.	S102999SCVT029_ASDSPTSPIR_PWR_ON_R	
4.	S102999SCVT030_ASDSPTSPIR_PWR_OFF_R	

Table 4-1. List of SPIRE Power ON/OFF Test Scripts

The following scripts are provided for SPIRE TBTV tests but may not be called explicitly from the procedure. If any need to be executed during the test then a PVS must be raised to control their execution.

Number	Tcl Script Name	Comment
1.	SPIRE-IST-RESET-PHOT-OFFSETS.tcl	
2.	SPIRE-IST-RESET-SPEC-OFFSETS.tcl	
3.	SPIRE-IST-START-PHOT-DATA.tcl	
4.	SPIRE-IST-START-SPEC-DATA.tcl	

5.	SPIRE-IST-STOP-DCU-DATA.tcl	
6.	SPIRE-IST-GO2REDY.tcl	
7.	SPIRE-IST-START-TEST.tcl	
8.	SPIRE-IST-END-TEST.tcl	
9.	SPIRE-IST-CPS-PHOT.tcl	
10.	SPIRE-IST-CPS-SPEC.tcl	
11.	SPIRE-IST-CRECm.tcl	
12.	SPIRE-IST-SPTMONITORING.tcl	

Table 4-2. List of Supplementary SPIRE TBTV Test Scripts

The actual test scripts and IEGSE software versions shall be identified at the TRR and documented in the minutes of meeting of the TRR.

4.2 Set-up

Ref. AD2

4.3 GSE

4.3.1 MGSE

No specific MGSE required.

4.3.2 CVSE

Ref. AD2.

4.3.3 EGSE

The figure below shows the detailed EGSE configuration to be used for the TBTV.

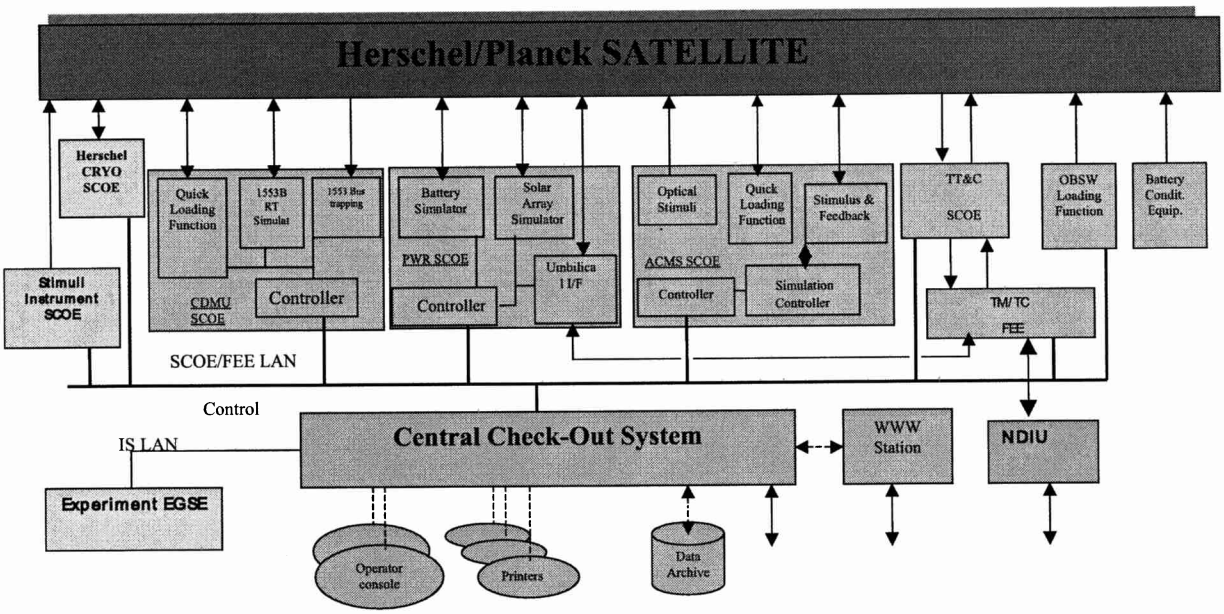


Figure 4-1: EGSE Configuration

The following additional EGSE is required:

- Monitor which displays the real time cryostat telemetry, to be positioned close to IEGSE monitors.

4.3.4 OGSE

None.

4.3.5 Special Equipment

None.

4.4 Test Facility

The test shall be performed at ESTEC premises Noordwijk in the LSS.

5 Test Conditions and Constraints

5.1 Environmental Conditions

All activities specified in this procedure shall be performed in the ESTEC LSS, the associated conditions are defined in Ref. AD2.

5.2 Cryostat Conditions

During the test the HTT shall be closed with shield cooling provided by an external Dewar.

~~Hell conditions, however there are no constraints if cryostat temperatures are in the~~ ranges given in section 7:

5.3 Expected Anomalies

The following anomalies are expected during the test:

- 3955 (if current MIB is used)
- 4495 (if current OBSW 2.2H is used)
- 4462 (if current OBSW 2.2H is used)
- 4457 (if current OBSW 2.2H is used)
- 4423 (SPIRE IEGSE affected)
- 4289 (SCAL TEMP - not corrected for TBTV)
- 4199 (Invalid OOL checks – not corrected for TBTV)
- 4195 (DPUM15V OOL – not corrected for TBTV)
- 4105 (Missing Text Calibs - not clear if MIB will be fixed for TBTV)
- 3512 (Missing Time Sync Pulse)
- 4517 (Time sync after reconfiguration – no response if this affects SPIRE)

5.4 Quality Assurance, Safety & Constraints

Ref. AD2

5.5 Precautions and Safety

Ref: AD2

5.6 Operational Constraints

SPIRE telecommanding shall be performed using the delivered and agreed set of SPIRE tcl scripts which are generated from the SPIRE CUS database (see the relevant release note for the script delivery to be used for the test. **Table 4-1** details the top-level scripts called during the test. SPIRE instrument housekeeping telemetry packets shall be received and presented on the instrument SCOS2000 monitors. Real time analysis of SPIRE science data packets shall be performed on the IEGSE by MPE. All SPIRE telemetry displayed on the SCOS2000 monitors is defined by the HPSDB (which uses the SPIRE MIB as input). All telecommands which are sent during the execution of the SPIRE tcl scripts are defined in the HPSDB as well (again based on SPIRE MIB).

5.6.1 General instructions for executing test procedures

- Before executing any of the procedures please always check with the Instrument-EGSE staff
- Any text in **boldface** in the procedural steps generally indicates an action which has to be performed manually by the I-EGSE staff.
- The last row in a procedure table should be used to record the overall Pass/Fail result of each test.
- The sequencing of the tests and under which phase of the test plan they are to be done is not implied by the order of the procedures in this note. They are given in the attached spreadsheet.

5.6.2 Assumptions/Pre-requisite Conditions

- The CCS is only required to check changes in instrument configuration related HK parameters.
- For each test the instrument will be in a pre-defined mode as listed in the IUM (**RD 1**).
- For the SPIRE Cooler recycle the Herschel cryostat must be tilted such that the plane of the SOB is at 20° from the vertical with the +Y Spacecraft axis downwards
- Correct parameters from SPT testing should be added to the CUS on the I-EGSE before TV/TB testing.
- The cryo cover temperature will be about 100 K rather than <15 K i.e. no active cooling.
- The converted TM parameter values are extracted from the MIB in use for PFM ILT. These values are subject to change for both prime and redundant operations.

5.6.3 *Open Issues*

- The ability to operate the PTC control loop is not yet confirmed – some extra interactive testing maybe required to allow this to happen and Photometer Thermal Control (PTC) Verification may overrun.
- SCAL4 photometric verification may be cut for time purposes but is included under SCAL Photometric Verification.
- If SPIRE needs three cooler recycles, RAL would prefer to run the 300 mK decontamination at some other point outside of the 48 hours TV/TB part of the Herschel test sequence. RAL could then leave the instrument in REDY mode at the end of 48 hours to find out the third hold time. (300 mK decontamination would heat the cooler and shorten the length).

5.7 Required Documents

The following SPIRE specific documents shall be on-hand at the TRR and during the entire test.

- This test procedure to be filled out and signed off page by page by the operator and PA.
- SPIRE I-EGSE User Manual (AD 3).

For potential failure investigations further documents might be required. Those have to be defined at the corresponding NRBs.

6 Responsibilities

The list below defines the allocation of responsibilities (nomination at TRR).

Responsibility	Name / Organisation
Test Director	M. ROCHE / TAS-F
Test Conductor	G. JAHN / TAS-F
EGSE Operator	AS PER SHIFT PLAN
IEGSE Operator	S. SIDHER / B..
Cryo Operator	AS PER SHIFT PLAN
PA Responsible	AS PER SHIFT PLAN
Instrument Representative	B. COLLAUDIN / TAS-F
ESA Representative	AS PER SHIFT PLAN

7 Step-by-step Procedure

7.0 Test Preparation

Test Location:	LSS ESTEC
Test Session Id:	2008_11_29_03_51_ hercdmu _ hpw523 _ REALTIME _ TBTVTPA1O 2008-11_30-07_32 _herdmu _ hpw523 _ REALTIME _ TBTVTP1 0b
Test Environment:	HP_2 - ASED _ TP_0236_ TBTV_ ENG_ 002

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: OFF						
0.1	Check that all open work identified at the TRR is closed	OK		OK		✓	
0.2	Check SPIRE FPU interface temperatures (throughout the test):						
	Level 0 (HTT upper bulk) T222	As per TRR		1.54 K		✓	
	Level 1 (Vent line) T234	As per TRR		3.791K		✓	
	Level 2 (OBA) T242	As per TRR		3.791K		✓	
0.3	No constraints on thermal shield or CVV	N/A					
0.4	Check cover temperature	80 – 110 K			(90 – 100 K in SPIRE XLS schedule v8)		
0.5	Stabiliity (drifting)	Flow rate of 4mg/sec		OK		✓	
	L0	< 0.21 K/h		OK		✓	

Enter Date/Time:	29/11/08	06:06	Sign Off:	SL

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	L1/L2	<250mK / hr on L1 No constraints on L2		OK		✓	
0.6	Check cryostat angle	As per TBTV test phase		20° W.		✓	
	SPIRE: OFF						

Enter Date/Time:	29/11/08	06:06.	Sign Off:	

7.1 SPIRE I-EGSE Configuration

PVS# C136

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: OFF						
1.1	Switch ON & configure SPIRE-IEGSE						
1.2	Confirm SPIRE I-EGSE is in correct configuration						
1.3	From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE: **connect HSPIREEGSE**	YZS29940= CONNECTED		Already Connected		✓	
1.4	Verify correct connection and time synchronisation with IEGSE: **Y102999ETVT036_ASDGEN_VERSPIREIEGSE**	OK		OK		✓	
1.5	On HPCCS start the following test script: **SPIRE_ALL_SubscribeParams**	OK		Already Running		✓	
1.6	If not running already, start the instrument temperature logging: **Z102999SCVT025_ASDGEN_INSTTEMP_LOG**	OK		OK		✓	
	SPIRE IEGSE ready for Test						

Enter Date/Time:	29/11/08	06:09	Sign Off:	

7.2 Switch On Nominal SPIRE to Standby (REDY) Mode

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 is in REDY mode. When in REDY mode one parameter remains OOL (soft), namely SMD2V505, which is also expected.

Duration: 0.5 hours

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: OFF						
2.0	Verify the following TCS baseplate temperature for SPIRE Warm Units before switching ON: **HSDCU (DEA88710)**	> -30°C & < +45 °C		6.19 °C		✓	
2.1	On HPCCS start Packet History displays for the following APIDs:1280,1282	OK					
2.2	From the HPCCS test conductor console start the test script to power on SPIRE Prime: **S102999SCVT027_ASDSPTSPIR_PWR_ON_P**	OK		ok	AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL	✓	
2.3	On HPCCS when prompted: "SPIRE Switch ON for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" **Select YES**	YES		YES		✓	

Enter Date/Time:	29/4/08	06:11	Sign Off:	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	The test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW (from secondary partition) and configure the instrument to Standby mode. Reply to prompts as indicated below.						
2.4	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**	✓	
2.5	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		✓	
2.6	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N Select OK to continue	 Not refreshing Not incrementing OK		OK		✓	
2.7	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters: THSK	 Refreshing @ 1Hz			**AND: SA_1_559**		

Enter Date/Time:	29/11/08	06.25	Sign Off:	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	TM2N Select OK to continue	Incrementing by 1 @ 1Hz OK					
2.8	On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT027_ASDSPTSPIR_PWR_ON_P it will prompt: "Set Bus Profile Back to Original Setting?" Select NO	NO		YES	But still SPIRE	✓	
2.9	At the prompt: "Bus Profile left unchanged" Select OK to continue	OK		N/A		✓	
2.10	Verify HK TM packets are being received on APIDs 1280 & 1282	OK		OK		✓	
2.11	On authorisation of SPIRE responsible execute the following test script: SPIRE-IST-SPTMONITORING	OK		Performed earlier as per AVS #C136 OK		✓	
2.12	Verify the following TCS baseplate temperature for SPIRE Warm Units before operating SPIRE: HSDCU (DEA88710)	> -15°C & < +45 °C		6.18.°C		OK	
	SPIRE: DPU & DRCU powered and in REDY mode (nom.)						

Enter Date/Time:	29/4/08	06:33	Sign Off:	

7.3 Procedure: Cooler recycle (manual)

Version: 1.0
Date: 24th July 2006
Purpose:
Recycle the cooler with operator intervention

Duration: ~2 hours

Preconditions:

- Manual recycle carried out under nominal temperature and cryostat operational conditions. (Manual will give best indication of hold time in flight.)
- **The calibration table CoolerRecycling.txt has been updated in the CUS following the manual cooler recycle**
- **Mission configuration changed on the I-EGSE (if the CUS scripts or Calibration tables have been updated)**
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- Herschel tilted such that SOB is tilted 20˚ from vertical towards +Y direction
- Level 0 temperature: <1.85 K predicted (Best <1.7 K – critical that this is maintained throughout recycle to ensure efficient condensation.)
- Level 1 temperature: < 5 K – not critical
- Level 2 temperature: No constraint

Initial Configuration:
SPIRE in REDY mode

Enter Date/Time:	29/11/08		Sign Off:	

Procedure Steps:

Start- 29/11/08 07:00

PVS# C148	Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	1	Execute TCL script SPIRE-IST-CRECm.tcl	SUBKTEMP	AFTER RECYCLE < 300mK		OK
	Test Result (Pass/Fail):					
	Duration of SPIRE Cooler Recycle Procedure:					

Mass Flow Rate : 4.0 mg/s

Test Pass/Fail Criteria

Pump Temperature ≥ 45K during whole condensation phase. Scripts run successfully or not at this point

Final Configuration: SPIRE in REDY mode with cooler recycled and detectors at <= 300 mK.

Enter Date/Time:	29/11/08	09:16	**Sign Off:**		

7.4 Procedure: Switch from REDY to PHOTSTBY

Duration: 0.25 hrs

29/4/08 09:18

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-BSM-ON.tcl	Switches on the BSM	CHOPSENSPWR JIGGSENSPWR MODE	0/1 ~~0~~/1 REDY/BSM_ON	0 1 ~~3~~ 0 1 BSM_ON
SPIRE-IST-SPT-BSM-INIT.tcl	Initialises the BSM	CHOPLOOPMODE JIGGLOOPMODE MODE	0/1 ~~0~~/1 BSM_ON/BSM_INIT	0 1. 3 1 BSM_INIT.
SPIRE-IST-SPT-PDET-ON.tcl	Switches on the Photometer arrays	MODE	BSM_INIT/PHOTSTBY	PHOT STBY

NCR4698

← PVS # C150

← PVS # NCR-4699 C151.

This is followed by a stabilisation period/contingency.

Duration: 1.0 hours

Enter Date/Time:	29/4/08.	10:45.	Sign Off:	

7.5 Procedure: Photometer bias phase optimisation

Version: 1.4
Date: 31st July 2008
1.0-1.1 Split previous detector bias optimisation into two following Tanya's recommendation
1.2-1.3 Set bias freq, amplitudes and phase range
1.3-1.4 Test sequence and script names defined
1.4-1.5 Cut stability tests as they replicate this test

Purpose:
Find the optimum bias phase versus frequency for operating the photometer under IST ground nominal conditions

Duration: (1hr stabilisation +) 4 hours

Preconditions:

- Functional tests SPIRE-IST-COLD-FUNC-DCU-04P,13P and SPIRE-IST-COLD-PHOT-VSS have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The establishment of the correct Vss settings (SPIRE-IST-COLD-PHOT-VSS)
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

PTC NOT operating during this test
Bias amplitudes 15, 30, 50 mV
Bias frequencies 70, 100, 130, 190 Hz
Phase Range – FM_IST SPT central phase +/-8.4 ˚ in steps of 1.4 ˚

Enter Date/Time:	29/4/08		Sign Off:	

Initial Configuration:
SPIRE in PHOTSTBY

PVS# C152

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-DNS-PHOT.tcl. (Resets SPIRE photometer bias and readout parameters to the IST nominal)	JFET voltage	~34 mV	N/A	29/11/08 Skipped PVS# C152.
2	Execute TCL script SPIRE-IST-PHASEUP-PHOT70.tcl • Observe signal levels and determine optimum phase setting for IST bias levels at 70Hz bias frequency • 3 bias amplitudes, with each phase up taking ~20 minutes each	N/A	N/A	N/A	11:10 OK. 11:47 RCR4692 PVS# C153
3	Execute TCL script SPIRE-IST-PHASEUP-PHOT100.tcl • Observe signal levels and determine optimum phase setting for IST bias levels at 100Hz bias frequency • 3 bias amplitudes, with each phase up taking ~20 minutes each	N/A	N/A	N/A	11:54, OK 12:19
4	Execute TCL script SPIRE-IST-PHASEUP-PHOT130.tcl • Observe signal levels and determine optimum phase setting for IST bias levels at 130Hz bias frequency • 3 bias amplitudes, with each phase up taking ~20 minutes each	N/A	N/A	N/A	12:22 OK 12:47
5	Execute TCL script SPIRE-IST-PHASEUP-PHOT190.tcl • Observe signal levels and determine optimum phase setting for IST bias levels at 190Hz bias frequency • 3 bias amplitudes, with each phase up taking ~20 minutes each	N/A	N/A	N/A	12:48 OK 13:13
6	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-SPEC.tcl to set the IST nominal detector settings	N/A	N/A	N/A	13:20 OK 13:21.
7	Analyse data in real time to determine IST ground nominal operating parameters and compare to ILT results – confirm ILT table entries.			Small Differences	OK 14:01.

PVS# C155

Test Result (Pass/Fail):

Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing

Enter Date/Time:	29/11/08	14:01	**Sign Off:**	

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	Approximate optimum phase settings for each detector: **Bias Level** **Frequency** **PSW Phase** **PMW Phase** **PLW Phase** **15** **70** **30** **70** **50** **70** . . **Create a new calibration table Phot_Noise_Settings.txt:** **Bias F, Samp F, PSW bias, PMW bias, PLW bias, PSW phase, PMW phase, PLW phase** **70** **100** **130** **190**				

RAL to provide

Final Configuration:
SPIRE in PHOTSTBY mode with bias set to IST nominal values

Enter Date/Time:	29/11/08		**Sign Off:**	

7.6 Procedure: Photometer bias phase characterisation with PCAL Flashes

Version: 1.4

Date: 31st July 2008

1.0-1.1 Photometer bias phase characterisation

1.0-1.2 Use FM IST SPT phase as central phase

Purpose:

Calibrate responsivity vs phase for the photometer under IST ground nominal conditions.

Duration: 0.5 hours

Preconditions:

- Functional tests SPIRE-IST-COLD-FUNC-DCU-04P,13P and SPIRE-IST-COLD-PHOT-VSS have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The establishment of the correct Vss settings (SPIRE-IST-COLD-PHOT-VSS)
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint
- **PTC NOT operating during this test**

Bias amplitudes 33 mV

Bias frequencies 130 Hz

Phase Range – FM_IST SPT central phase +70.0˚ in steps of 10˚

Initial Configuration:

SPIRE in PHOTSTBY

Enter Date/Time:	29/11/08.		Sign Off:	

Procedure Steps: 29/11/08 14:03

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-DNS-PHOT.tcl. (Resets SPIRE photometer bias and readout parameters to the IST nominal)	JFET voltage	~34 mV	N/A	OK
2	Execute TCL script SPIRE-IST-CPS-PHASEUP-~~SPEC~~PHOT160.tcl 1. Standard PCAL flash for spectrometer. Observe signal levels and determine response for the phase step. 2. Repeat one for next phase step for 7 steps.	Detector signal	N+/-dN mV	N/A	OK 15:09.
3	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-~~SPEC~~PHOT.tcl to set the IST nominal detector settings	N/A	N/A	N/A	Not required
4	Analyse data in real time to determine IST ground nominal operating parameters and compare to ILT results – confirm ILT table entries.				OK

PVS# C155

PVS# C155

PVS# ~~C156~~ C156

Test Result (Pass/Fail):

Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing

Approximate optimum phase settings for each detector:

Bias Level	Frequency	PSW Phase	PMW Phase	PLW Phase
33	130			

Create a new calibration table Phot_Noise_Settings.txt:

Phase, Samp F, PSW bias, PMW bias, PLW bias, PSW phase, PMW phase, PLW phase
n°
n+10°

Final Configuration: SPIRE in PHOTSTBY mode with bias set to IST nominal values

Enter Date/Time:	29/11/08 -	15:31	**Sign Off:**	/ R Goossens QA

7.7 Procedure: Photometer bias noise optimisation

Version: 1.2
Date: 31st July 2008
1.0-1.1 Split previous detector bias optimisation into two following Tanya's recommendation
1.1-1.2 Test sequence and script names defined
1.2-1.5 Remover 190 Hz.

Purpose:
Find the optimum bias level and frequency for operating the photometer under IST ground nominal conditions.

Duration: Approximately 4.5 hours

Preconditions:

- Functional tests SPIRE-IST-COLD-FUNC-DCU-04P,13P and SPIRE-IST-COLD-PHOT-VSS have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The establishment of the correct Vss settings (SPIRE-IST-COLD-PHOT-VSS)
- The establishment of the correct bias phase versus frequency and amplitude done during test 2.4
- **The input PSW, PMW and PLW phases to the CUS scripts SPIRE_IST_DNA_PHOT_AMP15/30/50 have been updated following phase-ups**
- **Mission configuration changed on the I-EGSE (if the CUS scripts or Calibration tables have been updated)**
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Bias and phases to use as per "Photometer bias phase optimisation" procedure.

Enter Date/Time:	29/4/2008		Sign Off:	

Initial Configuration: SPIRE in PHOTSTBY

Procedure Steps: 29/11/08 15:32

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-DNS-PHOT.tcl. (Resets SPIRE photometer bias and readout parameters to the IST nominal)	JFET voltage	~34 mV	N/A	OK
2	Execute TCL script SPIRE-IST-DNA-PHOT-AMP15.tcl • Set bias amplitude to 15mV • Set frequency to 70 Hz and predetermined phase – observe signal and measure noise • Set frequency to 100 Hz and predetermined phase – observe signal and measure noise • Set frequency to 130 Hz and predetermined phase – observe signal and measure noise If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-phot.tcl to set the IST nominal detector settings	N/A	N/A	N/A	15:35 OK Not performed 16:18
3	Execute TCL script SPIRE-IST-DNA-PHOT-AMP30.tcl • Set bias amplitude to 30mV • Set frequency to 70 Hz and predetermined phase – observe signal and measure noise • Set frequency to 100 Hz and predetermined phase – observe signal and measure noise • Set frequency to 130 Hz and predetermined phase – observe signal and measure noise If requested by the I-EGSE, execute TCL script Execute the TCL script SPIRE-IST-DNS-PHOT.tcl to set the IST nominal detector settings	N/A	N/A	N/A	16:23 Not performed 17:07

PNS# CI55 PHOT

Enter Date/Time:	29/11/08	17:07	Sign Off:

PJS

IC 158 → 159

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
4	Execute TCL script SPIRE-IST-DNA-PHOT-AMP50.tcl 17:20 • Set bias amplitude to 50mV • Set frequency to 70 Hz and predetermined phase – observe signal and measure noise • Set frequency to 100 Hz and predetermined phase – observe signal and measure noise • Set frequency to 130 Hz and predetermined phase – observe signal and measure noise If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-PHOT.tcl to set the IST nominal detector settings	N/A	N/A	N/A	✓
5	Analyse data in real time to determine IST ground nominal operating parameters	N/A	N/A	N/A	✓
6	If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-PHOT.tcl to apply the IST nominal bias settings 18:04	N/A	N/A	N/A	

Test Result (Pass/Fail):

Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing

Approximate optimum bias settings each detector: Note that the bias frequency has to be the same for all three arrays.

Bias Frequency:

	Bias Level	Phase
PSW		
PMW		
PLW.		

Final Configuration: SPIRE in PHOTSTBY mode with bias set to IST nominal values

Enter Date/Time:	21/11/08	18:06	**Sign Off:**	R. Goossens QA

7.8 Procedure: Photometer Ambient Background Verification

Version: 1.2

Date: 31st July 2008

Purpose: Determine the optical power load onto the photometer detectors using a detector "loadcurve" at fixed frequency and phase to measure the detector temperature.

1.1-1.2 Test sequence and script names defined

Duration: ~ 1 hour

Preconditions:

- Photometer IST Ground Nominal bias setting have been determined by procedure "Photometer bias optimisation"
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- **If the IST optimum phases are significantly different from the ILT values then the input phases in CUS script SPIRE_IST_LC_PHOT will need to be modified and the Mission Configuration updated on the I-EGSE.**
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:

SPIRE is set to PHOTSTBY

Enter Date/Time:	29/11/08	18:06	Sign Off:	/ R. Goossens QA

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-CPS-PHOT.tcl 18:06 • Standard PCAL flash for photometer	N/A	Detector signal N+/-dN mV		√
2	Execute TCL script SPIRE-IST-LC-PHOT.tcl 18:11 • Standard Load Curve	N/A	N/A		√
3	Execute TCL script SPIRE-IST-CPS-PHOT.tcl 18:42 • Standard PCAL flash for photometer	N/A	Detector signal N+/-dN mV		√
4	If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-PHOT.tcl to apply the IST nominal bias settings NOT necessary	N/A	N/A	N/A	√
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing.					

Final Configuration:
SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal

This is followed by a shift tidy up/contingency.

Duration: 1.0 hour

Enter Date/Time:	23/11/08	18:50	Sign Off:	R. Goossens QA

7.9 Procedure: PCAL Photometer Photometric Characterisation

Version: 1.0
Date: 10th October 2008

Purpose: Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power

Duration: Approximately 0.75 hours

Preconditions:

- Functional test SPIRE-IST-COLD-FUNC-PCAL-01 has been carried out successfully
- Photometer IST Ground Nominal bias settings have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:
SPIRE is set to PHOTSTBY with ground nominal detector bias settings

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-PON-PHOT.tcl • Set PCAL bias to 3.8 mA • Wait for 10 seconds	N/A	N/A	N/A	
2	Execute TCL script SPIRE-IST-LC-PHOT.tcl	N/A	N/A	N/A	
3	Execute TCL script SPIRE-IST-POF-PHOT.tcl • Set PCAL bias to 0 mA Wait for 10 seconds				
4	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-PHOT.tcl to set the IST nominal detector settings				
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point.					

PVS # CISS

Final Configuration:

SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal

Enter Date/Time:			**Sign Off:**	

Section 7.9 PVS#C155

2.3 Procedure: PCAL Photometer Photometric Characterisation

Version: 1.0
Date: 10th October 2008

Purpose: Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power

Duration: Approximately 0.75 hours
Preconditions:

- Functional test SPIRE-IST-COLD-FUNC-PCAL-01 has been carried out successfully
- Photometer IST Ground Nominal bias settings have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted RD3)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:
SPIRE is set to PHOTSTBY with ground nominal detector bias settings

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-PCALON-LC-PHOT.tcl 18:50 • Set PCAL bias to 3.8 mA • Wait for 10 seconds • Load curve • Set PCAL bias to 0 mA	N/A	N/A	N/A	✓
2	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-PHOT.tcl to set the IST nominal detector settings N/A				✓

HP-2-HSEO-TP-0248

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point.					

Final Configuration:
SPIRE in PHOTSTBY mode with bias set to IST Ground Nominal

29/11/08 19:21

Section 2.9. PUSHC155

7.10 Procedure: Photometer chop/jiggle mode POF2

Version: 1.0
Date: 24th July 2006
Purpose:
To exercise the photometer POF2 AOT (7 point jiggle map). Test chop and jiggle functions. – also sets photometer mode for thermal tests etc

Duration: ~1 hour

Preconditions:

- Photometer IST Ground Nominal bias setting have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- "PTC Headroom" procedure has been carried out and power setting has been determined
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration: SPIRE in PHOTSTBY

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-AOT-PHOTO-POINT-JIGGLE.tcl 19:24	N/A	N/A		✓
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not.					

Final Configuration: SPIRE in PHOTSTBY

Enter Date/Time:	29/11/08	19:49	**Sign Off:**	R Goossens & QA

7.11 Procedure: Photometer small map mode POF3

Version: 1.0
Date: 24th July 2006
Purpose:
To exercise the photometer POF3 AOT (64 point jiggle map). Test chop and jiggle functions. – also sets photometer mode for thermal tests etc

Duration: ~1 hour

Preconditions:

- Photometer IST Ground Nominal bias setting have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- "PTC Headroom" procedure has been carried out and power setting has been determined
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration: SPIRE in PHOTSTBY

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-AOT-PHOTO-SMALLMAP-JIGGLE.tcl 19:50	N/A	N/A		
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not.					

PVS# C159

Final Configuration: SPIRE in PHOTSTBY

Enter Date/Time:	25/01/08	19:50	**Sign Off:**	R. Goossens QA

Manual.

7.12 Procedure: Switch from PHOTSTBY to REDY

Not Needed. ~~Cooler~~ cooler recycle not needed. cooler still at 0.29K (ref PVS C157)

Duration: 0.25 hrs

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-PDET-OFF.tcl	Switches off the Photometer arrays	MODE	PHOTSTBY/PDET_OFF	
SPIRE-IST-SPT-BSM-OFF.tcl	Switches off the BSM	CHOPSENSPWR JIGGSENSPWR MODE	1/0 1/0 PDET_OFF/REDY	

This is followed by a shift tidy up a possible update of CUS parameters/contingency.

Duration: 1.25 hours

Enter Date/Time:			Sign Off:	R. Goossens QA

PVS c 157

7.13 Procedure: Cooler recycle (~~manual~~) automatic

PVS#C166

PVS#C137

Version: 1.0

Date: 24th July 2006

Purpose:

Recycle the cooler with operator intervention (when required, i.e. may be performed at another point in the procedure – PVS to be raised if this is the case)

Duration: ~2 hours

Preconditions:

- Manual recycle carried out under nominal temperature and cryostat operational conditions. (Manual will give best indication of hold time in flight.)
- **The calibration table CoolerRecycling.txt has been updated in the CUS following the manual cooler recycle**
- **Mission configuration changed on the I-EGSE (if the CUS scripts or Calibration tables have been updated)**
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- Herschel tilted such that SOB is tilted 20˚ from vertical towards +Y direction
- Level 0 temperature: <1.85 K predicted (Best <1.7 K – critical that this is maintained throughout recycle to ensure efficient condensation.)
- Level 1 temperature: < 5 K – not critical
- Level 2 temperature: No constraint

Initial Configuration:

SPIRE in REDY mode

Enter Date/Time:	30/11/08	03:00	Sign Off:	R. Goossens QA

Procedure Steps:

PVS c15x

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-CRECm.tcl a Start 23:00	SUBKTEMP	AFTER RECYCLE < 300mK	0.291 K.	Ok
Test Result (Pass/Fail):					
Duration of SPIRE Cooler Recycle Procedure:					

Test Pass/Fail Criteria

Pump Temperature ≥ 45K during whole condensation phase. Scripts run successfully or not at this point

Final Configuration: SPIRE in REDY mode with cooler recycled and detectors at <= 300 mK.

Enter Date/Time:	30/11/08	05:31	**Sign Off:**	R. Goossens QA

7.14 Procedure: Switch from REDY to PHOTSTBY

Manual

Not needed as L cooler recycle not performed at this time (ref PVS C157)

Duration: 0.25 hrs

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-BSM-ON.tcl	Switches on the BSM	CHOPSENSPWR JIGGSENSPWR MODE	0/1 0/1 REDY/BSM_ON	
SPIRE-IST-SPT-BSM-INIT.tcl	Initialises the BSM	CHOPLOOPMODE JIGGLOOPMODE MODE	0/1 0/1 BSM_ON/BSM_INIT	
SPIRE-IST-SPT-PDET-ON.tcl	Switches on the Photometer arrays	MODE	BSM_INIT/PHOTSTBY	

Enter Date/Time:			Sign Off:		/ R. Cousins QA

7.15 Procedure: Photometer Thermal Control (PTC) Verification

Version: 2.0

Date: 24th Jan 2008

1.0-1.1 Changed to add in ability to vary tuning parameters for control algorithm – three iterations of the test are expected

1.1-1.2- Test sequence and script names defined

Purpose:

To test detector thermal stability whilst under PTC control – this can be carried out at any point. (Failed during SPT.)

Duration: 1 hour

Preconditions:

- Functional test SPIRE-IST-COLD-FUNC-DCU-13P has been carried out successfully
- Photometer IST Ground Nominal bias settings have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The "PTC Headroom" procedure has been carried out and the optimum PTC power setting has been established
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration: SPIRE is in PHOTSTBY

Enter Date/Time:	29/11/08		Sign Off:	R Cousins QA

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-START-TEST.tcl 21:32 This sets the OBSID for the test	N/A	N/A	N/A	✓
2	Execute one of the following stand alone TCL scripts to switch PTC on and put it in VM control mode. The script to be run will be specified by the I-EGSE 1. SPIRE-IST-PTC-VM-PSWT1.tcl 2. SPIRE-IST-PTC-VM-SUBKTEMP.tcl 3. SPIRE-IST-PTC-VM-TC2.tcl 21:34 / 21:58	N/A	N/A	N/A	
3	Stop VM using pop up button when advised by I-EGSE staff • It may be necessary to edit one or more of command parameters in these scripts and rerun the script. • It may also be necessary to set the PTC heater power by sending the SEND_DRCU_COMMAND(0xA0C6xxxx,0), where xxxx will be specified by the I-EGSE. Value Entered: See PVS#C160				

PVS#C160

PVS#C137

PVS#C161

Enter Date/Time:	29/11/08		Sign Off:	R. Goossens QA

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
4	Execute TCL script SPIRE-IST-END-TEST.tcl 22:17 This resets the OBSID for the test	N/A	N/A	N/A	
5	Repeat above steps as requested by I-EGSE staff. Three repeats are expected but may require more.				
6	If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-PHOT.tcl to apply the IST nominal bias settings.	N/A	N/A	N/A	
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. SPIRE is in PHOTSTBY with detector temperature under PTC control					

Final Configuration: SPIRE is in PHOTSTBY with detector temperature under PTC control.

Enter Date/Time:	23/11/08	00:35	**Sign Off:**	R. Goossens QA

7.16 Procedure: Switch from PHOTSTBY to REDY

Duration: 0.25 hrs

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-PDET-OFF.tcl	Switches off the Photometer arrays	MODE	PHOTSTBY/PDET_OFF	✓
SPIRE-IST-SPT-BSM-OFF.tcl	Switches off the BSM	CHOPSENSPWR JIGGSENSPWR MODE	1/0 1/0 PDET_OFF/REDY	✓ 00:38

Enter Date/Time:	30/11/08	00:38	Sign Off:	R. Goossens QA

7.17 Procedure: Switch from REDY to SPECSTBY

Duration: 0.5 hrs

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-BSM-ON.tcl	Switches on the BSM	CHOPSENSPWR JIGGSENSPWR MODE	0/1 0/1 REDY/BSM_ON	V 00:40
SPIRE-IST-SPT-BSM-INIT.tcl	Initialises the BSM	CHOPLOOPMODE JIGGLOOPMODE MODE	3/0/1 3/0/1 BSM_ON/BSM_INIT	V 00:42
SPIRE-IST-SPT-SDET-ON.tcl	Switches on the Spectrometer arrays	MODE	BSM_INIT/SPECSTBY	V JFET problem.

NCR 4701
NCR 4704
NCR 4703
NCR 4705.

PVS#C163 ⇐ PVS#C164

PVS#C165

PVS#C167 ⇄ PVS#C169.

PVS#C170
PVS#C171

Enter Date/Time:	30/11/08	00:50	Sign Off:	R Goossens

7.18 Procedure: Spectrometer bias phase optimisation

Version: 1.1

Date: 31st July 2008

Split previous detector bias optimisation into two following Tanya's recommendation
1.0-1.1 Test sequence and script names defined.
1.0-1.2 Use SPT central phase. Correction of step size to 1.4˚.

.

Purpose:

Find the optimum bias phase versus frequency for operating the spectrometer under IST ground nominal conditions

Duration: 4.0 hours

Preconditions:

- Functional tests SPIRE-IST-FUNC-DCU-04S,13S and SPIRE-IST-COLD-SPEC-VSS have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The establishment of the correct Vss settings (SPIRE-IST-COLD-SPEC-VSS)
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Bias amplitudes 15, 30, 50 mV

Bias frequencies 80, 160, 240 Hz

Phase Range – FM-IST SPT central phase +/-8.4 ˚ in steps of 1.4 ˚

Initial Configuration:

SPIRE in IST-SPECSTBY

Enter Date/Time:	30/11/08		**Sign Off:**	R. Cassens QA

Procedure Steps: 30/4/08 · 08:36

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	Set offsets				
1	Execute TCL script SPIRE-IST-PHASEUP-SPEC80.tcl • Observe signal levels and determine optimum phase setting for IST bias levels • 3 bias amplitudes, with each phase up taking ~30 minutes each	N/A	N/A	N/A	11:36 OK
2	Execute TCL script SPIRE-IST-PHASEUP-SPEC160.tcl • Observe signal levels and determine optimum phase setting for IST bias levels • 3 bias amplitudes, with each phase up taking ~30 minutes each	N/A	N/A	N/A	11:58 OK
3	Execute TCL script SPIRE-IST-PHASEUP-SPEC240.tcl • Observe signal levels and determine optimum phase setting for IST bias levels • 3 bias amplitudes, with each phase up taking ~30 minutes each	N/A	N/A	N/A	12:33 OK
4	If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-SPEC.tcl to apply the IST nominal bias settings	N/A	N/A	N/A	Not Reqd 12:50
5	Analyse data in real time to determine IST ground nominal operating parameters and compare to ILT results – confirm ILT table entries.				13:05

Test Result (Pass/Fail):

Approximate optimum phase settings for each detector:

Bias Level	Frequency	SSW Phase	SLW Phase
15	80		
30	80		
50	80		

Enter Date/Time:	30/4/08	13:06	Sign Off:	

Test Pass/Fail Criteria & Final Configuration:
Scripts run successfully or not at this point. Analysis of data required by off-line processing.
SPIRE in IST-SPECSTBY mode with bias set to IST nominal values.

This is followed by a shift tidy up/contingency.

Duration: 1.0 hour

Enter Date/Time:	30/4/08		Sign Off:	

7.19 Procedure: Spectrometer bias phase characterisation with PCAL Flashes

Version: 1.1

Date: 31st July 2008

Split previous detector bias optimisation into two following Tanya's recommendation
1.0-1.1 Test sequence and script names defined.
1.0-1.2 Change to use FM-IST SPT central phase.

.

Purpose:

Calibrate responsivity vs phase for the spectrometer under IST ground nominal conditions

Duration: 0.5 hours

Preconditions:

- Functional tests SPIRE-IST-FUNC-DCU-04S,13S and SPIRE-IST-COLD-SPEC-VSS have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- The establishment of the correct Vss settings (SPIRE-IST-COLD-SPEC-VSS)
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Bias amplitudes 33 mV
Bias frequencies 160 Hz
Phase Range – FM IST SPT central phase +70˚ in steps of 10˚
Full PCAL current = 7 mA.

Initial Configuration:

SPIRE in IST-SPECSTBY

Enter Date/Time:			Sign Off:	

Procedure Steps: 30/11/08 13:17

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute the TCL script SPIRE-IST-DNS-SPEC.tcl to set the IST nominal detector settings	N/A	N/A	N/A	~~Not performed~~, OK. 13:17
2	Execute TCL script SPIRE-IST-CPS-PHASEUP-SPEC160.tcl 1. Standard PCAL flash for spectrometer. Observe signal levels and determine response for the phase step. 2. Repeat one for next phase step.	N/A	Detector signal N+/-dN mV (for PCAL flash)	N/A	13:18 First flash OK, Not OK.
3	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-SPEC.tcl to set the IST nominal detector settings	N/A	N/A	N/A	13:53 OK
4	Analyse data in real time to determine IST ground nominal operating parameters and compare to ILT results – confirm ILT table entries.				13:56

Test Result (Pass/Fail):

Approximate optimum phase settings for each detector:

Bias Level	Frequency	SSW Phase	SLW Phase
33	160		
33	160		
33	160		

.
.

Test Pass/Fail Criteria & Final Configuration:

Scripts run successfully or not at this point. Analysis of data required by off-line processing.
SPIRE in IST-SPECSTBY mode with bias set to IST nominal values.

Enter Date/Time:	30/11/08	13:56	Sign Off:	

7.20 Procedure: Spectrometer bias noise optimisation

Version: 2.2

Date: 31st July 2008

V1.0 to 1,1 – changed to "Set bias amplitude" and phase up per frequency setting – referred to setting "Frequency" before – didn't make sense.

V1.1 to V2.0 – split into two following Tanya's recommendation

V2.1 – text changed – incorrect description – removed switch and start from IST-SPECSTBY

V2.1-V2.2 - Test sequence and script names defined

Purpose:

Find the optimum bias level and frequency for operating the spectrometer under IST ground nominal conditions

Duration: 4.5 hours

Preconditions:

- Functional tests SPIRE-IST-FUNC-DCU-04S,13S have been carried out successfully.
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at ground nominal
- JFET Vss set correctly for optimum noise (SPIRE-IST-COLD-SPEC-VSS)
- Phase for each bias setting has been determined using test 2.12
- **The input SSW and SLW phases to the CUS scripts SPIRE_IST_DNA_SPEC_AMP15/30/50 have been updated following phase-ups**
- **Mission configuration changed on the I-EGSE (if the CUS scripts or Calibration tables have been updated)**
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:

SPIRE in IST-SPECSTBY

Enter Date/Time:	30/10/08		**Sign Off:**	

Procedure Steps: 30/11/08 13:57

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	Set offsets				
1	Execute TCL script SPIRE-IST-DNA-SPEC-AMP15.tcl • Set frequency to 80 Hz and IST nominal setting • Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 160 Hz and IST nominal setting • Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 240 Hz and IST nominal setting If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-SPEC.tcl to apply the IST nominal bias settings	N/A	N/A	N/A	13:57 OK Not Performed 14:30
2	Execute TCL script SPIRE-IST-DNA-SPEC-AMP30.tcl • Set frequency to 80 Hz and IST nominal setting • Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 160 Hz and IST nominal setting • Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 240 Hz and IST nominal setting If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-SPEC.tcl to apply the IST nominal bias settings	N/A	N/A	N/A	14:37 15:10 Not Performed
3	Execute TCL script SPIRE-IST-DNA-SPEC-AMP50.tcl • Set frequency to 80 Hz and IST nominal setting • Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 160 Hz and IST nominal setting	N/A	N/A	N/A	15:14

Enter Date/Time:	30/11/08	15:14	**Sign Off:**	

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	• Set bias amplitude to each predetermined level and phase - observe signal at each level and measure noise • Set frequency to 240 Hz and IST nominal setting If requested by the I-EGSE, execute TCL script SPIRE- IST -DNS-SPEC.tcl to apply the ILT nominal bias settings				OK 15:47 NOT Performed
4	Analyse data in real time to determine IST ground nominal operating parameters	N/A	N/A	N/A	OK

Test Result (Pass/Fail):

Approximate optimum bias settings each detector: Note that the bias frequency has to be the same for both arrays.

Nominal Bias Frequency:

	Bias Level	Phase
SSW		
SLW		

Test Pass/Fail Criteria & Final Configuration:

Scripts run successfully or not at this point. Analysis of data required by off-line processing.

SPIRE in IST-SPECSTBY mode with bias set to IST nominal values

Enter Date/Time:	30/11/08	15:50	**Sign Off:**	

7.21 Procedure: Level 1 Herschel-SPIRE Interface Test - High Resolution Mode Simulation

Version: 1.0
Date: 15th February 2008
Purpose:
To measure the Level 1 conductance to the HOB from a simulation of the SPIRE SMEC High Resolution Mode.

NOTE THIS NEEDS TO BE DONE AS OPEN LOOP SCANS.

Duration: 2hr

Preconditions:

- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- Herschel tilted such that SOB is tilted 20° from vertical towards +Y direction
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration: SPIRE is in SPEC STBY

Enter Date/Time:	30/4/08		Sign Off:		

Procedure Steps:

30/4/08 15:51,

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute SPIRE-IST-HIGH-RES-SMEC-L1.tcl	MODE SMECMOTORCURR	SPEC STBY Follows sawtooth pattern		15:51
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing.					

RVS C174 done

Final Configuration:
SPIRE is in the mode we started from – SPEC STBY

This is followed by a shift tidy /contingency.

Duration: 1.0 hour

Enter Date/Time:	30/11/08	17:25	Sign Off:	QA: R Goossens

7.22 Procedure: Level 1 Herschel-SPIRE Interface Test - Constant SMEC Power

Version: 1.0
Date: 15th February 2008
Purpose:
To measure the Level 1 conductance to the HOB from a constant power dissipation from the SPIRE SMEC Drive Coil.

Duration: 2hr

Preconditions:

- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- Herschel tilted such that SOB is tilted 20˚ from vertical towards +Y direction
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration: SPIRE is in SPEC STBY

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute SPIRE-IST-CONST-SMEC-L1.tcl 17:37	MODE SMECMOTORCURR	SPEC STBY Commanded Value	✓	
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing					

Final Configuration: SPIRE is in the mode we started from – SPEC STBY

Enter Date/Time:	20/11/08	10:11	**Sign Off:**	/ RA: R.Goossens

7.23 Procedure: Spectrometer Ambient Background Verification

Version: 1.2

Date: 31st July 2008

Purpose: Determine the optical power load onto the photometer detectors using a detector "loadcurve" at fixed frequency and phase to measure the detector temperature.

1.1-1.2 Test sequence and script names defined.

Duration: ~ 0.75 hours

Preconditions:

- Spectrometer IST Ground Nominal bias setting have been determined by procedure "Spectrometer bias optimisation"
- SPIRE is at ground nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- **If the IST optimum phases are significantly different from the ILT values then the input phases in CUS script SPIRE_IST_LC_SPEC will need to be modified and the Mission Configuration updated on the I-EGSE.**
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:

SPIRE is set to SPECSTBY

Enter Date/Time:	30/11/08	19:11	Sign Off:	/ QA: R. Goossens

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-CPS-SPEC.tcl 19:26 • Standard PCAL flash for spectrometer	N/A	Detector signal N+/-dN mV	✓	
2	Execute TCL script SPIRE-IST-LC-SPEC.tcl 19:47 • Main load curve script	N/A	N/A	✓	
3	Execute TCL script SPIRE-IST-CPS-SPEC.tcl 20:23 • Standard PCAL flash for spectrometer	N/A	Detector signal N+/-dN mV	✓	
4	If requested by the I-EGSE, execute TCL script SPIRE-IST-DNS-SPEC.tcl to apply the IST nominal bias settings	N/A	N/A	N/A	
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing					

Final Configuration:

SPIRE in IST-SPECSTBY mode with bias set to IST Ground Nominal

→ PVS #C176

→ PVS #C177

Enter Date/Time:	30/11/8	23:54	Sign Off:	QA: R. Goossens

7.24 Procedure: PCAL Spectrometer Photometric Characterisation

Version: 1.0
Date: 31st July 2008
V1.0-V1.1 Test sequence and script names defined. Added test script for PCAL flash characterisation

PVS H CISS

Version: 1.0
Date: 10th October 2008

PVS H 176

Purpose: Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power

Duration: 0.75 hours

Preconditions:

- Functional test SPIRE-IST-COLD-FUNC-PCAL-01 has been carried out successfully
- Photometer IST Ground Nominal bias settings have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:
SPIRE is set to SPECSTBY with ground nominal detector bias settings

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-PON-SPEC.tcl • Set PCAL bias to 7 mA • Wait for 10 seconds	N/A	N/A	N/A	
2	Execute TCL script SPIRE-IST-LC-SPEC.tcl	N/A	N/A	N/A	
3	Execute TCL script SPIRE-IST-POF-SPEC.tcl • Set PCAL bias to 0 mA Wait for 10 seconds				
4	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-SPEC.tcl to set the IST nominal detector settings				
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point.					

Final Configuration:

SPIRE in IST-SPECSTBY mode with bias set to IST Ground Nominal

Enter Date/Time:			**Sign Off:**	

Section 7.24 PVS CISS

2.5 Procedure: PCAL Spectrometer Photometric Characterisation

Version: 1.0
Date: 31st July 2008
V1.0-V1.1 Test sequence and script names defined. Added test script for PCAL flash characterisation

Version: 1.0
Date: 10th October 2008

Purpose: Determine the absorbed power from PCAL by taking a load curve with PCAL set to its nominal PCAL flash output power

Duration: ~ 0.75 hours

Preconditions:

- Functional test SPIRE-IST-COLD-FUNC-PCAL-01 has been carried out successfully
- Photometer IST Ground Nominal bias settings have been determined by procedure "Photometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted RD3)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:
SPIRE is set to SPECSTBY with ground nominal detector bias settings

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-PCALON-LC-SPEC.tcl	N/A	N/A	N/A	✓

Part of PVS # 176

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	• Set PCAL bias to 7 mA • Wait for 10 seconds • Load curve • Set PCAL bias to 0 mA				
2	If requested by the I-EGSE, execute the TCL script SPIRE-IST-DNS-SPEC.tcl to set the IST nominal detector settings				
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point.					

Final Configuration:
SPIRE in SPECSTBY mode with bias set to IST Ground Nominal

7.25 Procedure: SCAL Photometric Verification (skipped) PUS 176

Version: 1.1

Date: 31st July 2008

Invented to allow SCAL characterisation with the cryostat in the vertical position and SMEC inoperable.

Note we will only be able to do one of the calibration sources – suggest SCAL2

V1.0-v1.1 Test sequence and script names defined. Scripts also available for SCAL4

f

Purpose:

Determine the optical power load onto the spectrometer detectors from the calibration source using a detector "loadcurve" at fixed frequency and phase to measure the detector temperature.

Duration: 3 hours

Preconditions:

- Spectrometer IST Ground Nominal bias setting have been determined by procedure "Spectrometer bias optimisation"
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- The cooler is recycled, the detectors are at <300 mK and the detector temperatures are as stable as possible
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint

Initial Configuration:

SPIRE is set to IST-SPECSTBY

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure

Enter Date/Time:			Sign Off:	

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-IST-CPS-SPEC.tcl • Standard PCAL flash for spectrometer	N/A	Detector signal N+/-dN mV		
2	Set SCAL2 to 25K Execute standalone script SPIRE-IST-SCAL2-WARMUP.tcl Wait for SCAL2 to reach 25K Initially SCAL2 will be set to 25K.	SCAL2 temperature	SCAL2TEMP T +/- dT K		
3	Execute TCL script SPIRE-IST-CPS-SPEC.tcl Standard PCAL flash for spectrometer	N/A	Detector signal N+/-dN mV		
4	Execute TCL script SPIRE-IST-LC-SPEC.tcl	N/A	N/A		
5	Execute TCL script SPIRE-IST-CPS-SPEC.tcl • Standard PCAL flash for spectrometer	N/A	Detector signal N+/-dN mV		
6	Execute SPIRE-IST-SCAL2-COOLDOWN.tcl 1. Press ok to Switch off SCAL2				
7	**If SCAL2 is to be set to a different temperature then the CUS script StartSCAL2VM will first need to be modified and the Mission Configuration updated by the I-EGSE staff.**	N/A	N/A		
8	**Corresponding TCL scripts are also available for SCAL4, i.e. SPIRE-IST-SCAL4-WARMUP.tcl and SPIRE-IST-SCAL4-COOLDOWN.tcl.** **It may be necessary to run these if advised by the I-EGSE staff.**	N/A	N/A		
9	If requested by the I-EGSE staff, execute TCL script SPIRE-IST-RESET-SPEC-OFFSETS.tcl	N/A	N/A		
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing.					

Final Configuration:

Enter Date/Time:			**Sign Off:**	

SPIRE in IST-SPECSTBY mode with bias set to IST Ground Nominal and SCAL2 cooling to base temperature
The offsets will need resetting once base temperature is reached (~1 hour later)

Enter Date/Time:	01/12/08	00:00	Sign Off:	

7.26 Procedure: Switch from SPECSTBY to REDY

Duration: 0.25 hrs

PVS# → OK 00:02:51 sec.
C173 ✓
~~C178~~
~~C179~~
~~C180~~

Test Script	Description	Parameters	Expected Values Before/After	Actual Values Before/After
SPIRE-IST-SPT-SDET-OFF.tcl ✓ 00:04	Switches off the Spectrometer arrays	MODE	SPECSTBY/SDET_OFF	
SPIRE-IST-SPT-BSM-OFF.tcl ✓ 00:05	Switches off the BSM	CHOPSENSPWR JIGGSENSPWR MODE	1/0 1/0 SDET_OFF/REDY	

PVS# → ~~C178~~ C178, C179, C180, C182
C168 completed 01/12/08 @ 07:30

Enter Date/Time:	01/12/08	00:06	Sign Off:	R. Goossens QA

Skipped PVS # C183
1/12/08 07.30 SH
Then executed PVS # C193 8/12/08
12:02 SH

7.27 Procedure: 300 mK Stage Decontamination

Version: 1.1
Date: 31st July 2008
V1.0-V1.1 Test sequence and script names defined. **Only to be run once all the other tests have been completed.**

Purpose:
To remove any traces of Helium deposited over the 300 mK stage during testing

Duration: ~3hrs

Preconditions:

- Functional test SPIRE-IST-FUNC-SCU-07 has been carried out successfully.
- SPIRE is as close to Flight nominal operating temperature and temperatures are as stable as possible
- Cryostat flow rates are at natural flow rates ~4 mg/s
- Herschel tilted such that SOB is tilted 20˚ from vertical towards +Y direction
- Level 0 temperature: < 1.85 K drift < 0.21 K/hr (predicted)
- Level 1 temperature: < 5 K drift <0.25 K/hr
- Level 2 temperature: < 12 K no drift constraint
- **All SPIRE tests have been completed.**
- **THIS SHOULD BE LAST TEST TO BE RUN BEFORE THE END OF TV/TB**

Initial Configuration: SPIRE is in REDY

Enter Date/Time:			Sign Off:	

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute SPIRE-IST-DECONTAMINATE.tcl (Heat Switches are both set to OFF. Once PUMPHSTEMP =12 K, pump heater dissipation is set to 400 mW (then adjusted by CCS command with parameters from SPIRE I-EGSE personnel) to warm up the 300mK system ≥ 4 K for >1 hrs)	MODE	REDY		
Test Result (Pass/Fail):					
Test Pass/Fail Criteria: Scripts run successfully or not at this point. Analysis of data required by off-line processing.					

Final Configuration:

SPIRE is in the mode we started from – REDY

Enter Date/Time:			Sign Off:	

7.28 Switch Off Nominal SPIRE

Duration: 0.5 hours

11/12/08 04:44

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: in Standby (REDY) (nom.)						
28.1	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: **S102999SCVT028_ASDSPTSPIR_PWR_OFF_P**	OK		OK		✓	
28.2	On HPCCS when prompted: "SPIRE Switch OFF for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" **Select YES**	YES		YES		✓	
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.						

RVS 282

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	During Switch OFF of SPIRE the following (5,2) and (5,4) event messages on APID 1280 may be expected and do not indicate a problem: EVID 1313 No_MCU_Response_Error EVID 21773 ALARM_LSMCU_DEAD ✓					✓	
28.3	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N	 Not refreshing Not incrementing		 Not refreshing	**AND: SA_1_559**	✓	
28.4	Select OK to continue	OK		ok		✓	
28.5	On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT028_ASDSPTSPIR_PWR_OFF_P it will prompt: "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"						
28.6	Select OK to continue	OK		ok		✓	
28.7	On HPCCS stop Packet History displays for the following APIDs:1280,1282	OK		ok		✓	
	SPIRE: OFF						

Enter Date/Time:	11/12/08	15:28	Sign Off:	

7.29 Switch On Redundant SPIRE to Standby (REDY) Mode for TBTV

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 is in REDY mode. When in REDY mode one parameter remains OOL (soft), namely SMD2V505, which is also expected.

Duration: 0.5 hours

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: OFF						
29.0	Verify the following TCS baseplate temperature for SPIRE Warm Units before switching ON: **HSDCU (DEA88710)**	> -30°C & < +45°C					
29.1	On HPCCS start Packet History displays for the following APIDs:1281,1283	OK					
29.2	From the HPCCS test conductor console start the test script to power on SPIRE Redundant: **S102999SCVT029_ASDSPTSPIR_PWR_ON_R**	OK			AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL		
29.3	On HPCCS when prompted: "SPIRE Switch ON for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" **Select YES**	YES					

Enter Date/Time:			Sign Off:	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	The test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW (from primary partition) and configure the instrument to Standby mode. Reply to prompts as indicated below.						
29.4	On HPCCS when prompted: "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue" **Select OK**	OK			**AND: SA_1_559**		
29.5	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					
29.6	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N Select OK to continue	 Not refreshing Not incrementing OK					
29.7	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters: THSK	 Refreshing @ 1Hz			**AND: SA_1_559**		

Enter Date/Time:			Sign Off:	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	TM2N Select OK to continue	Incrementing by 1 @ 1Hz OK					
29.8	On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT029_ASDSPTSPIR_PWR_ON_R it will prompt: "Set Bus Profile Back to Original Setting?" Select NO	NO					
29.9	At the prompt: "Bus Profile left unchanged" Select OK to continue	OK					
29.10	Verify HK TM packets are being received on APIDs 1281 & 1283	OK					
29.11	On authorisation of SPIRE responsible execute the following test script: SPIRE-IST-SPTMONITORING	OK					
29.12	Verify the following TCS baseplate temperature for SPIRE Warm Units before operating SPIRE: **HSDCU (DEA88710)**	> -15°C & < +45 °C					
	SPIRE: DPU & DRCU powered and in REDY mode (red.)						

Enter Date/Time:			Sign Off:	

7.30 Switch OFF Redundant SPIRE for TBTV

The following procedure will switch SPIRE Redundant from Standby (REDY) to OFF.

Duration: 0.5 hours

27/4/08 05:46 PVS C136

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	SPIRE: in Standby (REDY) (red.)						
30.1	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: **S102999SCVT030_ASDSPTSPIR_PWR_OFF_R**	OK		OK		✓	
30.2	On HPCCS when prompted: "SPIRE Switch OFF for SPTs in Hel/Hell conditions ONLY - Select NO to abort TS if not correct" **Select YES**	YES		YES		✓	
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.						

Enter Date/Time:	27/4/08	05:47	**Sign Off:**	

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	During Switch OFF of SPIRE the following (5,2) and (5,4) event messages on APID 1281 may be expected and do not indicate a problem: EVID 1313 No_MCU_Response_Error EVID 21773 ALARM_LSMCU_DEAD				Recurrence of NCR4639		
30.3	On HPCCS when prompted: "Check Telemetry No Longer Updating - OK to continue" Check that parameters: THSK TM2N	 Not refreshing Not incrementing		 OK	**AND: SA_1_559**	 ✓	
30.4	Select OK to continue	OK		OK		✓	
30.5	On HPCCS when all autonomous actions have been completed by the power on script S102999SCVT030_ASDSPTSPIR_PWR_OFF_R it will prompt: "Bus profile left as SPIRE PRIME, change manually after if required - OK to continue"			OK		✓	
30.6	Select OK to continue	OK		OK		✓	
30.7	On HPCCS stop Packet History displays for the following APIDs:1281,1283	OK		OK		✓	
	SPIRE: OFF						

Enter Date/Time:	29/11/08	05:55	Sign Off:	

7.31 IEGSE Disconnection (optional)

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	SPIRE: OFF						
	Initial Conditions: Nominal & Redundant SPIRE warm units OFF						
31.1	From HPCCS Test Conductor console issue command to disconnect from SPIRE I-EGSE **disconnect HSPIREEGSE**	OK		N/A		N/A	
31.2	On HPCSS terminate **SPIRE_ALL_SubscribeParams**.tcl test script.	OK		OK		✓	
31.3	Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful	**YZS29940= DISCONNECTED**		N/A		✓	
31.4	If required Switch OFF I-EGSE i.a.w. AD 3	OK		N/A		✓	
	SPIRE IEGSE: DISCONNECTED						

Enter Date/Time:	04/12/08		**Sign Off:**	

8 Summary Sheets

8.1 Procedure Variation Summary

	Test Change	Curr. No.: N/A. Date 30/11/08 Page 1 of 1	
Test designation: SPIRE TV Phase 10	Test Procedure: TP-0248	Issue: 2	Rev.: –
Test step changed: N/A	Reason for Change: Summary of PVSs Executed during test		

Non-SPIRE	SPIRE
C138? → C149	C136 C150 ← C148 C151 C152 C153
C154	C155 C156 C157
C137 C166	C158 C159 C160
C161	C162 C163 C164 C165 C167 C168 C169 C170 C171
C172	C173
C175	C174. C176 C178
C177	
C179 C180 C182	C183 C193

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

Table 8-1: Procedure Variation Sheet

See overall TBTV PVS list for details of the above PVS.

8.2 Non Conformance Report (NCR) Summary

NCR - No.	NCR - Title	Date	Open Closed	PA sig.
4697	Not SPIRE related			
4698	Offsets Not Applied Correctly			
4699	Invalid Name in Test Script			
4692	Recurrence			
4701	Parameter OOLs (Soft)			
4702	Not SPIRE related			
4704	Parameter OOLs (Hard)			
4703	Hard OOL on GRENFEEDCBMEF			
4705	Detector Problem in Spectroscopy			
4708	Not SPIRE related			
4707	Duplicate of 4701.			
4725	VC1 overflow during SPIRE PTC Verification			

Table 8-2: Non-Conformance Record Sheet

8.3 Sign-off Sheet

	Date	Signature
Test Director	05DEC08	
Test Conductor	1.12.08	
Test Operator	1.12.08	
PA Responsible	01/12/'08	
ESA Representative	1/12/08	

9 ANNEX A – Cryo Requirements

Colour coding						
No restriction						
Some Restriction						
Very Restricted						
Procedure	**Description**	**Type**	**Hel**	**Hell**	**Orient**	**Cover**
SPIRE-FM-DPU-ON-P	DPU PRIME Power up and OBS start	IST-FT	YES	YES	Any	Any
SPIRE-FM-DRCU-ON-P	DRCU PRIME Power up	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCU-02-P	SCU Nom. Science Contents check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCU-03-P	SCU DC Thermometry check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCU-06-P	SCU AC Thermometry check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCU-07-P	Sorption Cooler Heaters Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-PCAL-01-P	PCAL Characterisation Test PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCAL-01-P	SCAL Characterisation Test PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SCAL-02-P (TBC)	SCAL PID Check PRIME (TBC)	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-MCU-01-P	MCU Boot Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-MCU-03-P	MCU Nom. Science Contents Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-BSM-01-P	BSM Chop/Jiggle Sensors check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-BSM-03-P	BSM Open Loop Dynamics Check PRIME	IST-FT	YES	YES	Any	Any

SPIRE-FM-FUNC-BSM-05A-P	BSM Open Loop Chop Test PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-BSM-05B-P	BSM Close Loop Chop Test PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-BSM-0FF-P	BSM switch OFF	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-SMEC-02A-P	Unlatch the SMEC	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-03-P	SMEC Encoder Levels Check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-01-P	SMEC Encoder and LVDT check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-04A-P	SMEC Open Loop Position check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-09-P	SMEC Open Loop Scan check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-04B-P	SMEC Close Loop Position check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-07-P	SMEC Close Loop Scan check PRIME	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-SMEC-OFF-P	SMEC switch OFF	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-SMEC-02B-P	Latch the SMEC	IST-FT	YES	YES	Y vertical	Any
SPIRE-FM-FUNC-DCU-02-P	DCU Nominal Sci. Contents Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-11-PHOT-P	Phot. BDAs Switch ON Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-13-PHOT-P	Phot. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-14-PHOT-P	Phot. BDAs Noise Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-11-SPEC-P	Spec. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-13-SPEC-P	Spec. BDAs Integrity Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-FUNC-DCU-14-SPEC-P	Spec. BDAs Noise Check PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-SDET-OFF-P	Spec. BDAs switch OFF	IST-FT	YES	YES	Any	Any
SPIRE-FM-MCU-OFF-P	MCU switch OFF PRIME	IST-FT	YES	YES	Any	Any

SPIRE-FM-SCU-OFF-P	SCU switch OFF PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-DRCU-OFF-P	DRCU power OFF PRIME	IST-FT	YES	YES	Any	Any
SPIRE-FM-DPU-OFF-P	DPU power OFF PRIME	IST-FT	YES	YES	Any	Any
TV/TB Procedures from HERE						
Procedure	**Type**	**Hel**	**Hell**	**Orient**	**Cover**	**Notes**
Cooler recycle (manual)	TV-TB	NO	YES	Y +20 to 30	Any	Orientation is minimum - can also be done with Y horizontal
Photometer Thermal Control Verification	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal
PCAL Photometer Photometric Characterisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y horizontal
SCAL Photometric Characterisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation requirement is only for cooler recycle - once completed can be any orientation
PCAL Spectrometer Photometric Characterisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation requirement is only for cooler recycle - once completed can be any orientation
Photometer chop/jiggle mode POF2	TV-TB	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
300mk Stage Decontamination	TV-TB	NO	YES	Y +20 to 30	Any	Orientation is minimum - can also be done with Y vertical
Spectrometer Ambient Background Verification	TV-TB	NO	YES	Y +20 to 30	Variable	Orientation is minimum - can also be done with Y vertical
Photometer Ambient Background Verification	TV-TB	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures
Level 1 Herschel-SPIRE Interface Test - High Resolution Mode Simulation	TV-TB	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures. Y tilt OK for the emulation as the SMEC is not

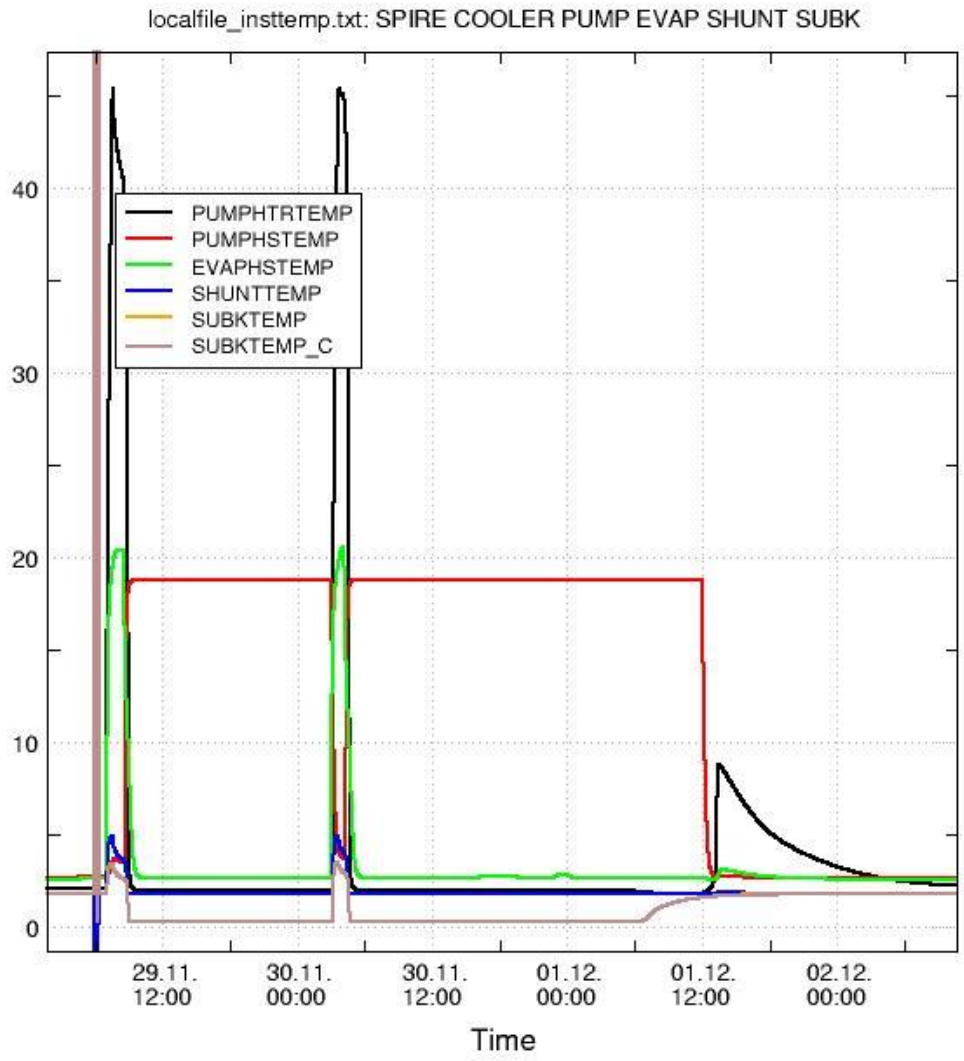
						moved.
Level 1 Herschel-SPIRE Interface Test - Constant SMEC Power	TV-TB	NO	YES	Y +20 to 30	Variable	Cryostat lid can be at any temperature during procedure but some tests will require various and stable lid temperatures. Y tilt OK for the emulation as the SMEC is not moved.
Photometer bias phase characterisation with PCAL Flash	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical
Photometer bias phase optimisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical
Photometer bias noise optimisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical
Spectrometer bias phase optimisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical
Spectrometer bias noise optimisation	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical
Spectrometer bias phase characterisation with PCAL Flash	TV-TB	NO	YES	Y +20 to 30	Cold <15K	Orientation is minimum - can also be done with Y vertical

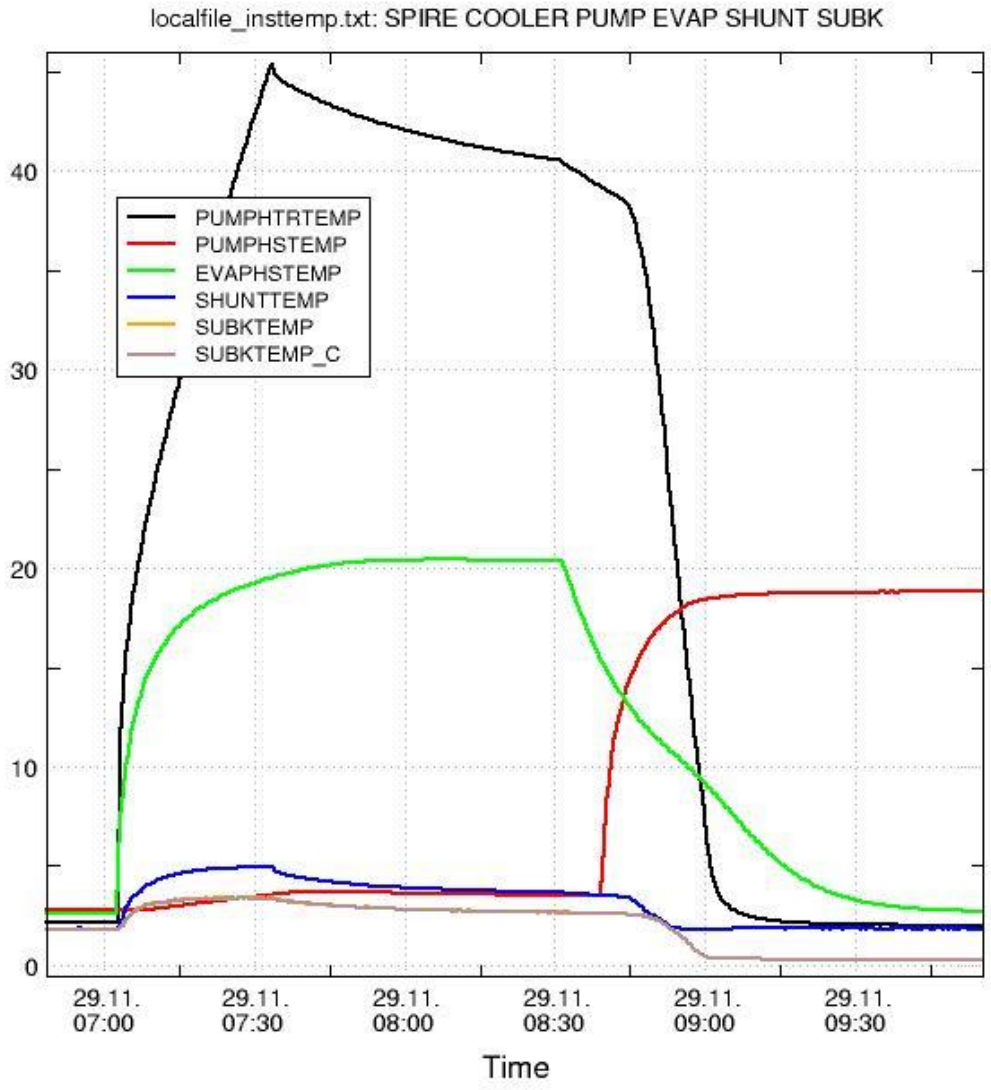
END OF DOCUMENT

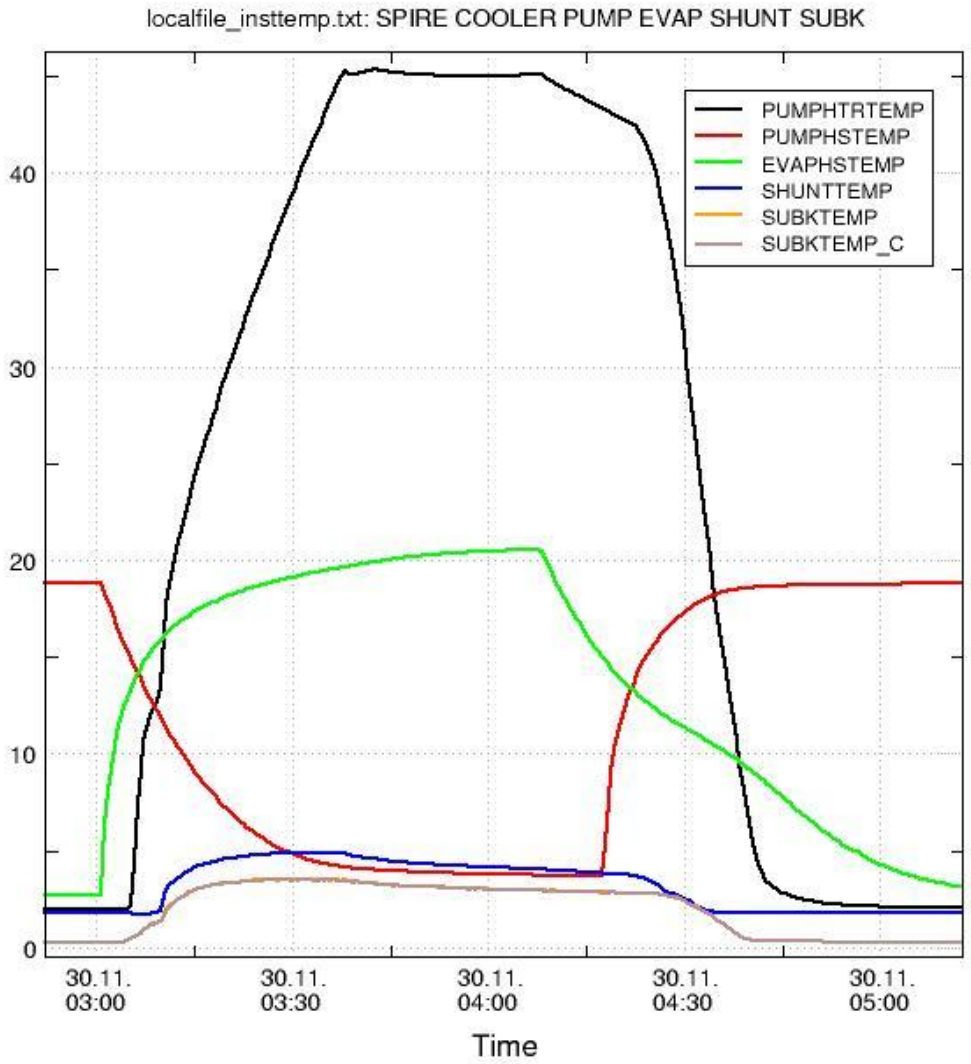
	Name	Dep./Comp.
	Baldock Richard	FAE12
	Barlage Bernhard	AED13
	Bayer Thomas	ASA42
	Brune Holger	ASA45
X	Chen Bing	HE Space
X	Davis William	Captec
	Edelhoff Dirk	AED21
	Fehringer Alexander	ASG15
X	Fricke Wolfgang Dr.	AED 65
	Geiger Hermann	ASA42
	Grasl Andreas	OTN/ASA44
X	Grasshoff Brigitte	AET12
X	Hamer Simon	Terma
	Hanka, Erhard	FI522
X	Hendrikse Jeffrey	HE Space
X	Hendry David	Terma
	Hengstler Reinhold	ASA42
	Hinger Jürgen	ASG23
X	Hohn Rüdiger	AED65
	Hopfgarten Michael	AET32
	Huber Johann	ASA42
	Hund Walter	ASE252
X	Idler Siegmund	AED312
	Iványi von András	FAE12
	Jahn Gerd Dr.	ASG23
	Jolk Matthias	AET1
X	Klenke Uwe	ASG72
	Kölle Markus	ASA43
	König Werner	AET32
X	Koppe Axel	AED312
X	Kroeker Jürgen	AED65
X	La Gioia Valentina	Terma
	Lang Jürgen	ASE252
	Langenstein Rolf	AED15
X	Langfermann Michael	ASA41
	Leitermann Stefan	AET12
X	Liberatore Danilo	Rhea
X	Martin Olivier	Altec
X	Maukisch Jan	ASA43
X	Much Christoph	ASA43
X	Müller Martin	ASA43
	Pietroboni Karin	AED65
	Reichle Konrad	ASA42
	Runge Axel	OTN/ASA44
	Saal Christoph	External
	Schink Dietmar	AED321
	Schmidt Thomas	AED15
	Schweickert Gunn	ASG23

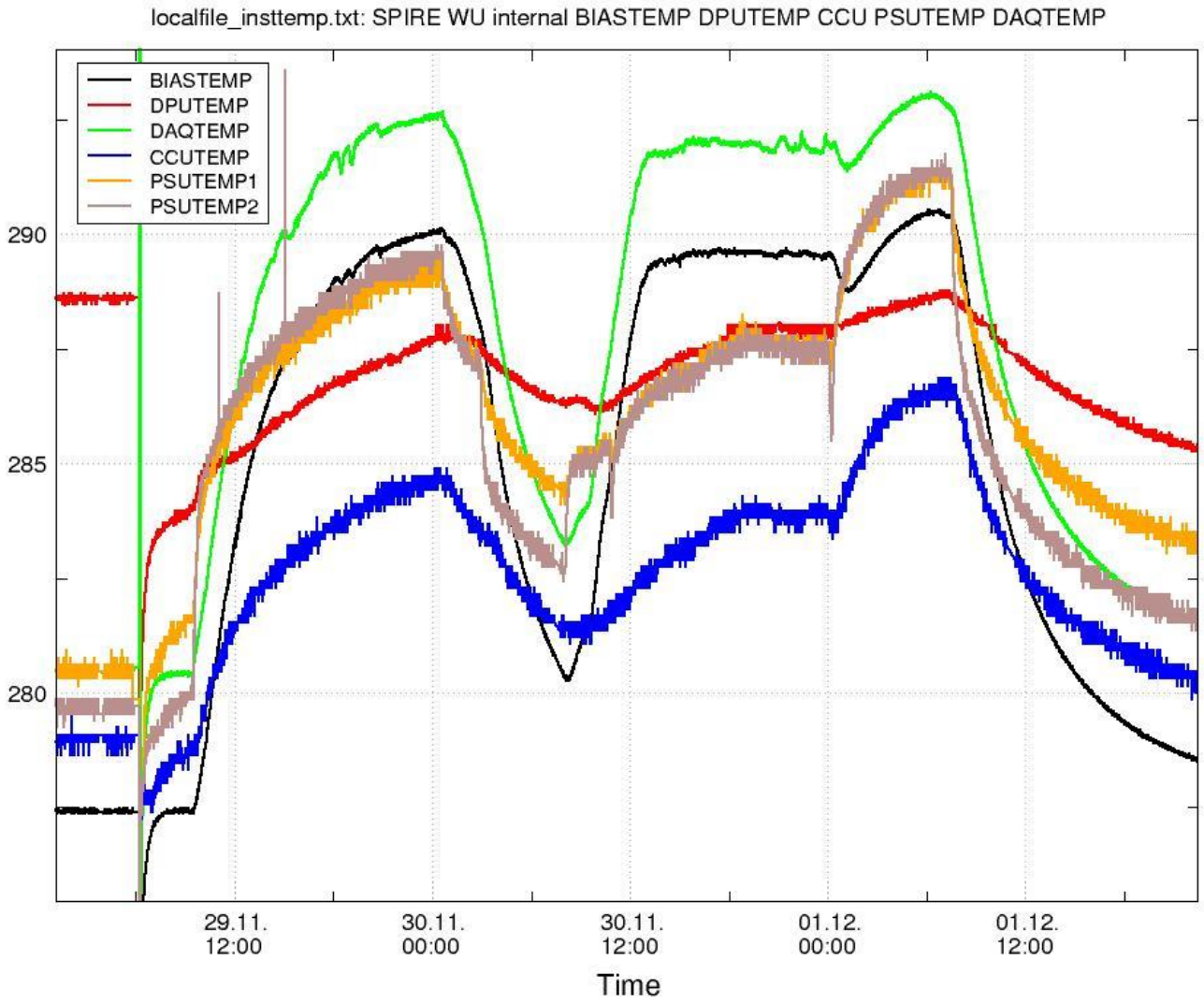
	Name	Dep./Comp.
	Sonn Nico	ASG51
	Steininger Eric	AED321
X	Stritter Rene	AED11
	Suess Rudi	OTN/ASA44
	Theunissen Martijn	DSSA
X	Vascotto Riccardo	HE Space
	Wagner Klaus	ASG23
X	Wietbrock Walter	AET12
	Wöhler Hans	ASG23
	Wössner Ulrich	ASE252
	Zumstein Armin	AED15
X	ESA/ESTEC	ESA
X	Thales Alenia Space Cannes	TAS-F
	Thales Alenia Space Torino	TAS-I
	Instruments:	
X	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

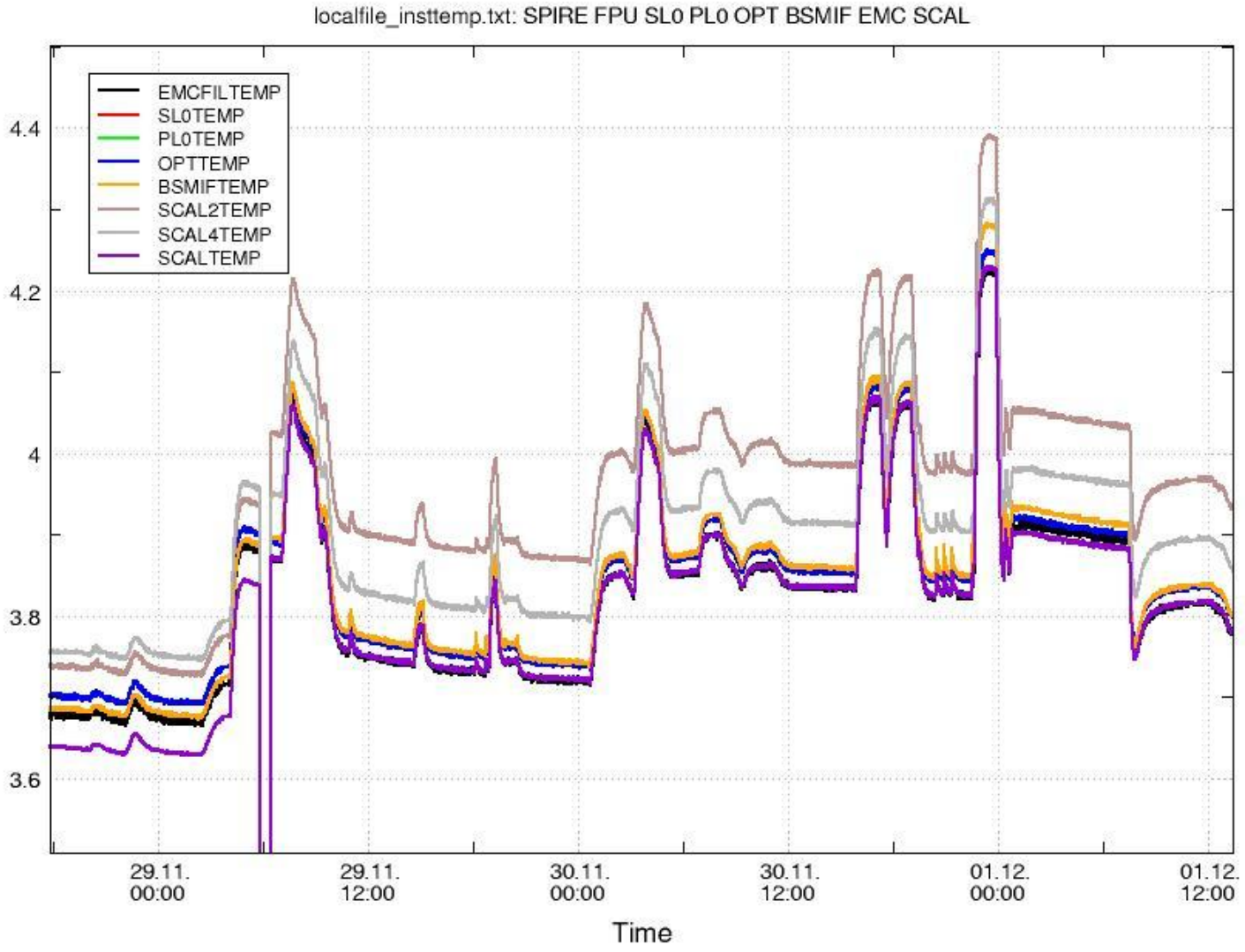
6 Appendix 2: SPIRE Temperatures during Phase 10 in TB Hot

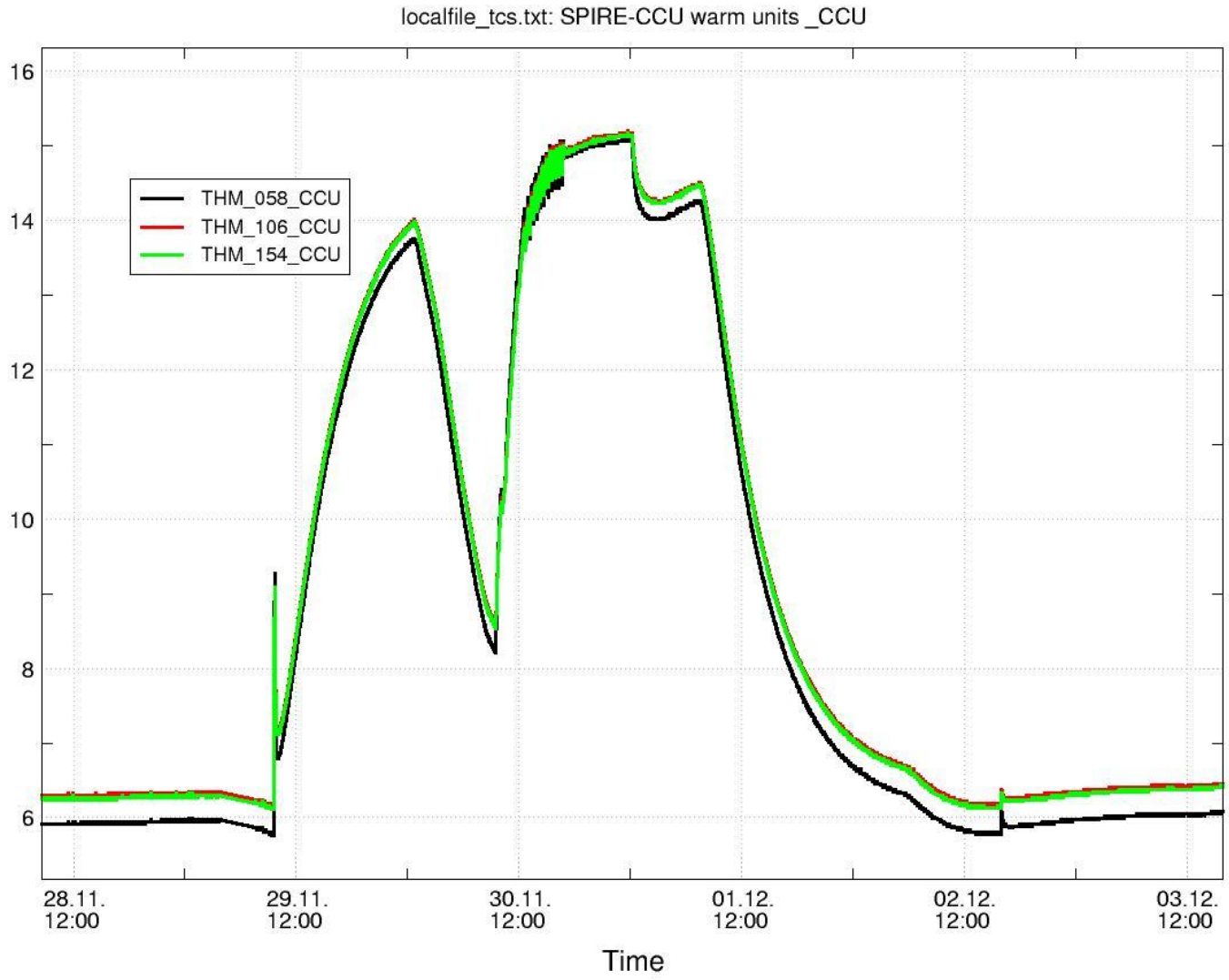

localfile_insttemp.txt: SPIRE COOLER PUMP EVAP SHUNT SUBK
PUMPHTRTEMP
PUMPHSTEMP
EVAPHSTEMP
SHUNTTEMP
SUBKTEMP
SUBKTEMP_C
40
30
20
10
0
29.11. 12:00
30.11. 00:00
30.11. 12:00
01.12. 00:00
01.12. 12:00
02.12. 00:00
Time


localfile_insttemp.txt: SPIRE COOLER PUMP EVAP SHUNT SUBK
PUMPHTRTEMP
PUMPHSTEMP
EVAPHSTEMP
SHUNTTEMP
SUBKTEMP
SUBKTEMP_C
40
30
20
10
0
29.11. 07:00
29.11. 07:30
29.11. 08:00
29.11. 08:30
29.11. 09:00
29.11. 09:30
Time


localfile_insttemp.txt: SPIRE COOLER PUMP EVAP SHUNT SUBK
PUMPHTRTEMP
PUMPHSTEMP
EVAPHSTEMP
SHUNTTEMP
SUBKTEMP
SUBKTEMP_C
40
30
20
10
0
30.11.
03:00
30.11.
03:30
30.11.
04:00
30.11.
04:30
30.11.
05:00
Time


localfile_insttemp.txt: SPIRE WU internal BIASTEMP DPUTEMP CCU PSUTEMP DAQTEMP
BIASTEMP
DPUTEMP
DAQTEMP
CCUTEMP
PSUTEMP1
PSUTEMP2
290
285
280
29.11. 12:00
30.11. 00:00
30.11. 12:00
01.12. 00:00
01.12. 12:00
Time


localfile_insttemp.txt: SPIRE FPU SL0 PL0 OPT BSMIF EMC SCAL
EMCFILTEMP
SL0TEMP
PL0TEMP
OPTTEMP
BSMIFTEMP
SCAL2TEMP
SCAL4TEMP
SCALTEMP
4.4
4.2
4
3.8
3.6
29.11. 00:00
29.11. 12:00
30.11. 00:00
30.11. 12:00
01.12. 00:00
01.12. 12:00
Time


localfile_tcs.txt: SPIRE-CCU warm units _CCU
THM_058_CCU
THM_106_CCU
THM_154_CCU
16
14
12
10
8
6
28.11.
12:00
29.11.
12:00
30.11.
12:00
01.12.
12:00
02.12.
12:00
03.12.
12:00
Time

E N D O F D O C U M E N T

	Name	Dep./Comp.		Name	Dep./Comp.
	Baldock Richard	FAE12	X	Theunissen Martijn	ASA43
	Barlage Bernhard	AED13	X	Vascotto Riccardo	HE Space
	Bayer Thomas	ASA42		Wagner Klaus	ASG23
	Brune Holger	ASA45	X	Wietbrock Walter	AET12
	Chen Bing	HE Space		Wöhler Hans	ASG23
X	Davis William	Captec		Wössner Ulrich	ASE252
	Edelhoff Dirk	AED21		Zumstein Armin	AED15
	Fehringer Alexander	ASG15			
	Fricke Wolfgang Dr.	AED 65			
	Geiger Hermann	ASA42			
	Grasl Andreas	OTN/ASA44			
X	Grasshoff Brigitte	AET12			
X	Hamer Simon	Terma			
	Hanka, Erhard	FI522			
	Hendrikse Jeffrey	HE Space			
X	Hendry David	Terma			
	Hengstler Reinhold	ASA42			
	Hinger Jürgen	ASG23			
	Hofmann Rolf	ASE252			
X	Hohn Rüdiger	AED65			
	Hopfgarten Michael	AET32			
	Huber Johann	ASA42			
	Hund Walter	ASE252			
X	Idler Siegmund	AED312			
	Iványi von András	FAE12			
X	Jahn Gerd Dr.	ASG23		ESA/ESTEC	ESA
X	Kölle Markus	ASA43	X	Thales Alenia Space Cannes	TAS-F
X	Koppe Axel	AED312		Thales Alenia Space Torino	TAS-I
X	Kroeker Jürgen	AED65			
	Lang Jürgen	ASE252			
	Langenstein Rolf	AED15		**Instruments:**	
X	Langfermann Michael	ASA41		MPE (PACS)	MPE
	Liberatore Danilo	Rhea	X	RAL (SPIRE)	RAL
X	Martin Olivier	Altec		SRON (HIFI)	SRON
X	Maukisch Jan	ASA43			
X	Much Christoph	ASA43			
X	Müller Martin	ASA43		**Subcontractors:**	
	Pietroboni Karin	AED65		Austrian Aerospace	AAE
	Reichle Konrad	ASA42		Austrian Aerospace	AAEM
	Runge Axel	OTN/ASA44		BOC Edwards	BOCE
	Saal Christoph	External		Dutch Space Solar Arrays	DSSA
	Schink Dietmar	AED321		EADS Astrium Sub-Subsyst. & Equipment	ASSE
	Schmidt Thomas	AED15		EADS CASA Espacio	CASA
	Schweickert Gunn	ASG23		EADS CASA Espacio	ECAS
	Sonn Nico	ASG51		European Test Services	ETS
	Steininger Eric	AED321		Patria New Technologies Oy	PANT
X	Stritter Rene	AED11		SENER Ingenieria SA	SEN
	Suess Rudi	OTN/ASA44		Thales Alenia Space, Antwerp	TAS-ETCA