EADS astrium

Test Procedure

Herschel

Title: **IST Instrument Commissioning**
SPIRE FM Peak-up Mode Test

CI-No: 125200

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1 Scope

This document describes the Peak-up Mode Tests to be performed on the SPIRE FM Instrument for IST Instrument Commissioning (ref AD6 & AD9) in HeI or HeII conditions.

This test will be run independently of the other parts of the IST Instrument Commissioning.

Both redundancies are tested within this procedure.

Constraints General

- This procedure requires the presence of RAL personnel as the I-EGSE will be required to assess the results online as part of the pass/fail criteria.
- Before carrying out the next procedure within the test sequence always ask for the go ahead by the RAL staff.

Constraints Specific

- There are no specific constraints for this test

1.1 Objective

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

1.2 Test Flow

The test flow is as follows:

1. Power on and configure SPIRE I-EGSE for test
2. Power on and configure SVM for test including CCU
3. Power on NOMINAL SPIRE Prime DPU & DRCU and enable Mil1553B-bus interface
4. Run Peak-up Mode Procedures
5. Power off MCU Prime
6. Disable Mil1553B-bus interface and Power off SPIRE Prime DRCU & DPU
7. Repeat Steps 3 – 6 for Spire Redundant Peak-up Mode Procedures
8. Power off SVM including CCU
9. Switch off all EGSE

2 Documents/Drawings

2.1 Applicable Documents

AD 1	FM SPIRE PFM Final Electrical Integration Procedure	HP-2-ASED-TP-0166
AD 2	Herschel PCDU & CDMS Nominal Switch On/Off Procedure	HP-2-ASED-PR-0070
AD 3	Herschel SAT Emergency Switch Off Procedure	HP-2-ASED-PR-0071
AD 4	PA Plan	HP-2-ASED-PL-0007
AD 5	I-EGSE Switch ON/OFF Procedure	TBI
AD 6	Test Specification for Herschel Instrument AVM & FM Tests Performed at Satellite Level, Issue 2	H-P-2-ASP-TS-1083
AD 7	H-P GDIR	H-P-1-ASPI-SP-0027
AD 8	SPIRE I-EGSE Set-Up, Issue 2.2	SPIRE-RAL-DOC-002841
AD 9	Herschel Integrated Satellite Test Specification, Issue 6	H-P-2-ASP-SP-0939
AD 10	Herschel IST Lead Procedure	HP-2-ASED-TP-0134

2.2 Reference Documents

RD 1	Herschel Planck Central Checkout System System User Manual	H-P-4-TE-MA-0010
RD 2	SPIRE Cold Functional Test Procedures, Iss. 2.5	SPIRE-RAL-PRC-2398
RD 3	Herschel CDMU ASW S/W Interface Control Document	H-P-4-SSF-IC-0001
RD 4	Herschel CDMU BSW S/W Interface Control Document	H-P-4-SES-NT-0076
RD 5	SPIRE IID-B	SCI-PT-IIDB/SPIRE-02124

RD 6	SPIRE Functional Test Specification Iss. 1.4	SPIRE-RAL-DOC-001652
RD 7	SPIRE Instrument User Manual Iss. 1.0	SPIRE-RAL-PRJ-002395
RD 8	H/P OBT-UTC Time Synchronisation Technical Note Iss. 1.3	PT-CMOC-OPS-TN-6604-OPS- OGH
RD 9	SPIRE Peak-up Mode Test Procedure; Issue 1.0	SPIRE-RAL-PRC-3033

2.3 Other Documents

None

2.4 Acronyms & Abbreviations

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

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

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

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

3 Configuration

3.1 Satellite Configuration

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

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

3.2 EGSE Configuration

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

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

3.3 Set-up

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

4 Test Sequence

Ensure that the latest deliveries of SPIRE Peak-up Mode test scripts are installed on the CCS prior to start of test. The SPIRE I-EGSE will be running the following software for the test:

I-EGSE Software	Version	Comment
SPIRE MIB version		
SPIRE CUS version		
SCOS version		

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

The normal sequence of events for a Peak-up mode operation is:

Send peak-up mode command to SPIRE

SPIRE executes a set of operations to determine the offsets to bring the source back onto the central pixel (takes approximately 3 mins)

SPIRE issues an event packet, TM(5,1) containing the offsets in y and z.

The CDMS acts on this event packet and sends the appropriate TC(s) to the AOCS.

There are 11 TCL scripts to verify full compliance to the interface:

Test Script	Delay/ seconds	Yangle Raw Decimal / Hex	Zangle Raw Decimal/Hex	Comments
SPIRE-IST-PeakUpTest-1.tcl	180	500 / 0x01f4	500 / 0x01f4	Move +5 arcsec in Y and Z
SPIRE-IST-PeakUpTest-2.tcl	10	-500 /0x81f4	-500 / 0x81f4	Move -5 arcsec in Y and Z
SPIRE-IST-PeakUpTest-3.tcl	10	200 / 0x00c8	-200 / 0x80c8	Move +2 arcsec in Y and -2 arcsec in Z
SPIRE-IST-PeakUpTest-4.tcl	10	-200 / 0x80c8	200 / 0x00c8	Move -2 arcsec in Y and +2 arcsec in Z
SPIRE-IST-PeakUpTest-5.tcl	10	10100 / 0x2774	100 / 0x0064	Move +10.1 arcsec in Y and +1 arcsec in Z. Should be flagged as an error by the AOCS.

Test Script	Delay/ seconds	Yangle Raw Decimal / Hex	Zangle Raw Decimal/Hex	Comments
SPIRE-IST-PeakUpTest-6.tcl	10	100 / 0x0064	10100 / 0x2774	Move +1 arcsec in Y and +10.1 arcsec in Z. Should be flagged as an error by the AOCS.
SPIRE-IST-PeakUpTest-7.tcl	10	10100 / 0x2774	10100 / 0x2774	Move +10.1 arcsec in Y and +10.1 arcsec in Z. Should be flagged as an error by the AOCS.
SPIRE-IST-PeakUpTest-8.tcl	10	-10100 / 0xa774	100 / 0x0064	Move -10.1 arcsec in Y and +1 arcsec in Z. Should be flagged as an error by the AOCS.
SPIRE-IST-PeakUpTest-9.tcl	10	100 / 0x0064	-10100 / 0xa774	Move +1 arcsec in Y and -10.1 arcsec in Z. Should be flagged as an error by the AOCS.
SPIRE-IST-PeakUpTest-10.tcl	10	-10100 / 0xa774	-10100 / 0xa774	Move -10.1 arcsec in Y and -10.1 arcsec in Z. Should be flagged as an error by the AOCS.
SPIRE-IST-PeakUpTest-11.tcl	10	0 / 0x0	0 / 0x0	No movement in Y or Z. How does the AOCS treat this event?

5 Conditions

5.1 Personnel

Responsibility	Name / Organisation
Test Director	
Test Conductor	
EGSE Operator	
PA Responsible	
Instrument Representative	
Customer Representative	
ESA Representative	

5.2 Environmental

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

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

S/C Environmental	Required	Actual
S/C Orientation	20° tilted aroud Z-axis, +Y pointing down	
Cryostat Status (Hel/Hell)	He 2	
Cryostat Level 0 Temp	1.77 K <T<1.82 K	
Cryostat Level 1 Temp	< 7 K	
Cryostat Level 2 Temp	< 12 K	
Cryostat Level 3 Temp	N/A	N/A

5.3 General Precautions and Safety

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

5.3.1 General Safety Requirements, Precautions

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

5.3.2 ESD constraints

Normal ESD constraints are to be observed during the test.

5.3.3 Cryo Specific Safety Requirements

During the test the CCU may be connected to the Cryostat sensors and valves. Although no valve operation is performed in this test all Cryogenic specific safety requirements shall be considered when running this procedure as indicated below.

Safety instructions for cryogenic hazards coming from the Helium system are as follows:

1	Helium itself is a non-toxic gas. The hazards to be expected are personal injuries from frostbites (cold surfaces, cold gas plumes), asphyxiation due to insufficient oxygen in the remaining air, loss of orientation due to dense fog generation and impacts of cold damaged structures.
2	Due to the amount of stored energy the Herschel cryostat is a pressure vessel and the general rules for pressure vessel design have to be followed. In addition to these general rules, the safety regulations at CSG launch site have to be considered. The application of these rules leads to a safety concept, which is based on the 'leak before burst' criterion. Herschel is based on the following safety and reliability philosophy: a. Two failure tolerant b. Three independent paths for overpressure relief c. Passive safety system for all operation modes (no active controls for monitoring is required at any time) As emergency situations may occur at unexpected points in time and typically need immediate action, the full hierarchy of the project cannot be deployed and consultation of all knowledgeable persons may not be possible.
3	The main intent of immediate actions will therefore be to ensure safety of personnel and to bring the S/C into a safe waiting condition. The priority of safeguarding is 1) Personnel 2) S/C 3) Facility 4) Support equipment The second aim is to keep the cryostat near the foreseen test conditions in order to continue the test without unnecessary time delay if the failure can be corrected.
4	The ASED test director (or his representative) will be informed by the test personnel of any non-conformances, alarm and unforeseen events that might lead to emergency situations. The ASED test director (or his representative) will initiate immediate steps and call the decision committee (ASED test director, ASED PA, ESA test director, ASP representative, ETS representative) if necessary.

5	Prior to begin a pre-task briefing shall be performed to inform all participants about purpose of operation, possible hazards and emergency shut down
6	In case of operation of the Cryostat safety system the following IMMEDIATE activities shall be performed: • Operation of the safety valve: EVERYBODY has to leave the test room, except test Conductor and necessary CVSE operations personnel • Operation of burst disc: EVERYBODY has to leave the test room

5.3.4 Special QA Requirements

None.

5.4 GSE

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

5.4.1 MGSE

None.

5.4.2 CVSE

None.

5.4.3 EGSE

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

5.4.4 OGSE

None.

5.4.5 Special Equipment

None.

6 Verification Requirements and Test Criteria

This is a functional check of a specific SPIRE FM mode test in Hel or Hell conditions and in AIT configuration as per AD6 and AD9.

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

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

Enter Start Date|Time:			

7 Test Procedure

7.1 Initial EGSE and Satellite Configuration for the Test

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

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

In case of anomaly on SPIRE requiring immediate switch off as directed by SPIRE responsible supporting the test section 7.2.5 shall be executed.

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

Enter Start Date|Time:			

7.2 Step by Step Procedure

Test Location:	
Test Session Id:	
Test Environment:	

7.2.1 EGSE & Satellite Switch On for Peak-up Mode Test

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	Satellite & EGSE Switch On						
1	Confirm I-EGSE physically connected to HPCCS	OK					
2	Switch on & configure SPIRE I-EGSE i.a.w. **AD5 & AD 8**	OK					
3	Confirm SPIRE I-EGSE is in the correct configuration as per AD5 & AD 8	OK					
4	Switch on HPCCS, SCOEs and Satellite/SVM i.a.w. AD 10 section TBD (IST START for SPIRE Commissioning)	OK					
5	Confirm that EGSE and Satellite are in the correct configuration as per AD 2	OK					
6	If not already on, from HPCCS power ON CCU A & CCU B by						

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value	Remarks	P	N
	executing test script: **K102999ECVT001_ASDGENCCU_ABPWRON**	OK					
7	If not already enabled, from HPCCS enable Monitoring Mode 1 (512sec cycle) for CCU A & B by executing test script: **K102999ECVT001_ASDGENCCU_MnEBOTH1**	OK					
8	Confirm that the ACMS is connected and powered on (ACC in SCM mode)	OK					
9	From HPCCS Test Conductor console issue command to connect to SPIRE I-EGSE **connect HSPIREEGSE**	OK					
10	Confirm from HPCCS and SPIRE I-EGSE that the connection has been established	YZS29940= CONNECTED			**AND SYS_PARS**		
11	Verify that I-EGSE is receiving CCU Cryo packets	OK					
12	On HPCCS start the following test script: **ALL_SubscribeParams.tcl**	OK					
13	Verify HPCCS-IEGSE connection by sending test command: **YC00X066** From the manual command stack (repeater value of "0")	OK					
14	If required load Synoptics INSTRUMENTS on HPCCS to display SPIRE status overview						
	READY FOR START OF SPIRE PEAK-UP MODE TEST						

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.2 SPIRE Peak-up Mode Tests - Nominal

7.2.2.1 Switch ON SPIRE PRIME

The following will switch ON and configure SPIRE Prime instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1280 dec and 1282 decimal (these can be observed using TMPH with corresponding filter – note however a limited number of TMPHs should be running at one time).

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 this is also expected.

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	On HPCCS start Packet History displays for the following APIDs:1280,1282	OK				
2.	From the HPCCS test conductor console start the test script to power on SPIRE Prime: **S102999SCVT031_ASDCFTSPIR_PWR_ON_P**	OK		AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL		

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
3.	On HPCCS when prompted: "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				
	If **YES** is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below.					
4.	On HPCCS when prompted: "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue" Select OK	OK		**AND: SA_1_559**		

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
5.	If I-EGSE connected when prompted on HPCCS, perform check requested then select **OK**: `"Check IEGSE Time Consistent - OK to continue when RAL confirm"`	OK				
6.	On HPCCS when prompted: `"Check Telemetry No Longer Updating - OK to continue"` Check that parameters: THSK TM2N Select OK to continue	 Not refreshing Not incrementing OK				
7.	On HPCCS when prompted: `"Check Telemetry Updating Correctly - OK to continue"` Check that parameters: THSK TM2N Select OK to continue	 Refreshing @ 1Hz Incrementing by 1 @ 1Hz OK		**AND: SA_1_559**		

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
8.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT031_ASDCFTSPIR_PWR_ON_P** it will prompt: "`Set Bus Profile Back to Original Setting?`" Select NO	NO				
9.	At the prompt: "`Bus Profile left unchanged`" Select OK to continue	OK				
10.	Verify HK TM packets are being received on APIDs 1280 & 1282	OK				
	SPIRE DPU & DRCU powered					

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.2.2 Peak-up Mode Procedure – Nominal

The instrument shall be in DPU ON mode before test execution

Step	Action(s)	Description	Comments
	The following step will generate peak-up command(s) to be sent to the ACMS. However because the test configuration is not a dynamic one (i.e. MTL controlled), these commands will have no direct effect on the ACMS (i.e. no manoeuvre performed), instead the ACMS will generate 5,1 events		
1	Execute TCL script SPIRE-IST-PeakUpTest-<n>.tcl Where n = 1 to 11.	If n=1 Wait for ~3 minutes, otherwise wait for 10 seconds (see table in section 4)	
2	Check that 5,1 event packet is issued with correct contents on the CCS See **Appendix A** for an example of a peak-up event packet dump	Event ID = 0x0504 SID = 0x5101 Instrument ID = 2 Yangle – see section 2.2 Zangle – see section 2.2 The I-EGSE staff will also check the contents of peak-up event packet.	
3	Check CDMS issues correct commands to AOCS	Post test check by AOCS experts to see if the command to move is in accordance with	

Enter Start Date|Time:			

	Verify that the ACMS reports corresponding 8,6 packets with the correct content for the peak-up commands sent by SPIRE.	the peak-up event packet.	
4	Wait for the I-EGSE staff before executing next test script		
5	Wait for AOCS to stabilise	This wait time is to be specified by AOCS experts	

SPIRE remains in DPU ON mode after test execution

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Switch OFF SPIRE PRIME

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	From the HPCCS test conductor console start the test script to power OFF SPIRE Prime: **S102999SCVT032_ASDCFTSPIR_PWR_OFF_P**	OK				
2.	On HPCCS when prompted: "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.					

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	Note that 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: a) EVID 1313 No_MCU_Response_Error b) EVID 21773 ALARM_LSMCU_DEAD **However, be aware that if FDIR is enabled for SPIRE in the CDMU then this may trigger an OBCP**					
3.	On HPCCS when prompted: `"Check Telemetry No Longer Updating - OK to continue"` Check that parameters: THSK TM2N	 Not refreshing Not incrementing		**AND: SA_1_559**		
4.	Select OK to continue	OK				

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
5.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT032_ASDCFTSPIR_PWR_OFF_P** it will prompt: "`Bus profile left as SPIRE PRIME, change manually after if required - OK to continue`"					
6.	Select OK to continue	OK				
7.	On HPCCS stop Packet History displays for the following APIDs:1280,1282	OK				
	SPIRE PRIME OFF					

Enter Start Date|Time:			

7.2.3 SPIRE Peak-up Mode Test – Redundant

7.2.3.1 Switch ON SPIRE REDUNDANT

The following will switch ON and configure SPIRE Redundant instrument in REDY (Standby) mode. HKTM packets will be generated on APIDs 1281 dec and 1283 decimal (these can be observed using TMPH with corresponding filter – note however a limited number of TMPHs should be running at one time).

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 this is also expected.

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	On HPCCS start Packet History displays for the following APIDs:1281,1283	OK				
2.	From the HPCCS test conductor console start the test script to power on SPIRE Redundant: **S102999SCVT033_ASDCFTSPIR_PWR_ON_R**	OK		AND: ZAD07999, ZAD14999 MIM: LCL_HERSCHEL		

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
3.	On HPCCS when prompted: "SPIRE Switch ON for Cold FT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				
	If **YES** is selected the test script will go on to automatically power on all SPIRE warm units, force boot the DPU ASW and configure the instrument to Standby mode. Reply to prompts as indicated below.					
4.	On HPCCS when prompted: "Check Telemetry Updating Correctly and OBT is Consistent with CDMU - OK to continue" **Select OK**	OK		**AND: SA_1_559**		
5.	If I-EGSE connected when prompted on HPCCS, perform check requested then select **OK**: "Check IEGSE Time Consistent - OK to continue when RAL confirm"	OK				

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
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				
7.	On HPCCS when prompted: "Check Telemetry Updating Correctly - OK to continue" Check that parameters: THSK TM2N Select OK to continue	 Refreshing @ 1Hz Incrementing by 1 @ 1Hz OK		**AND: SA_1_559**		

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
8.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT033_ASDCFTSPIR_PWR_ON_R** it will prompt: "`Set Bus Profile Back to Original Setting?`" Select NO	NO				
9.	At the prompt: "`Bus Profile left unchanged`" Select OK to continue	OK				
10.	Verify HK TM packets are being received on APIDs 1281 & 1283	OK				
	SPIRE DPU & DRCU Redundant powered					

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.3.2 Peak-up Mode Test – Redundant

Step	Action(s)	Description	Comments
1	Execute TCL script SPIRE-IST-PeakUpTest-<n>.tcl Where n = 1 to 11.	If n=1 Wait for ~3 minutes, otherwise wait for 10 seconds (see table in section 2.2)	
2	Check event packet is issued with correct contents on the CCS See **Appendix A** for an example of a peak-up event packet dump	Event ID = 0x0504 SID = 0x5101 Instrument ID = 2 Yangle – see section 2.2 Zangle – see section 2.2 The I-EGSE staff will also check the contents of peak-up event packet.	
3	Check CDMS issues correct commands to AOCS	Post test check by AOCS experts to see if the command to move is in accordance with the peak-up event packet.	
4	Wait for the I-EGSE staff before executing next test script		
5	Wait for AOCS to stabilise	This wait time is to be specified by AOCS experts	

Enter Start Date|Time:			

7.2.3.3 Switch OFF SPIRE REDUNDANT

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
1.	From the HPCCS test conductor console start the test script to power OFF SPIRE REDUNDANT: **S102999SCVT034_ASDCFTSPIR_PWR_OFF_R**	OK				
2.	On HPCCS when prompted: "SPIRE Switch OFF for CFT related tests in Hel/Hell conditions only - Select NO to abort TS if not correct" **Select YES**	YES				
	If **YES** is selected the test script will go on to automatically power off all SPIRE warm units.					

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
	Note: During Switch OFF of SPIRE, the following (5,1) and (5,4) event messages on APID 1281 may be expected and do not indicate a problem: c) EVID 1313 No_MCU_Response_Error d) EVID 21773 ALARM_LSMCU_DEAD **However, be aware that if FDIR is enabled for SPIRE in the CDMU then this may trigger an OBCP**					
3.	On HPCCS when prompted: `"Check Telemetry No Longer Updating - OK to continue"` Check that parameters: THSK TM2N	 Not refreshing Not incrementing		**AND: SA_1_559**		
4.	Select OK to continue	OK				

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

Step-No.	Test-Step-Description	Nominal Value	Actual Value	Remarks	P	N
5.	On HPCCS when all autonomous actions have been completed by the power on script **S102999SCVT034_ASDCFTSPIR_PWR_OFF_R** it will prompt: "`Bus profile left as SPIRE PRIME, change manually after if required - OK to continue`"					
6.	Select OK to continue	OK				
7.	On HPCCS stop Packet History displays for the following APIDs:1281,1283	OK				
	SPIRE REDUNDANT OFF					

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.4 Satellite & EGSE Switch Off After Peak-up Mode Test

Step-No.	Test-Step-Description	Nominal Value	Tolerance	Actual Value		P	N
	Satellite & EGSE Switch Off						
	Initial Conditions: Nominal & Redundant SPIRE warm units OFF						
1	On HPCSS terminate **ALL_SubscribeParams.tcl** test script.	OK					
2	From HPCCS Test Conductor console issue command to disconnect from SPIRE I-EGSE **disconnect HSPIREEGSE**	OK					
3	Confirm from HPCSS and SPIRE I-EGSE that the disconnection was successful	YZS29940= DISCONNECTED			**AND SYS_PARS**		
4	If no longer required switch OFF I-EGSE i.a.w. AD 5	OK					
5	Power OFF i.a.w. AD 10 section TBD (IST END for SPIRE Commissioning)	OK					
6	Confirm both Satellite and EGSE powered down	OK					
	End Conditions: Satellite and EGSE OFF						
	END OF SPIRE Peak-up Mode TEST						

Enter Date/Time:			Sign Off:	

Enter Start Date|Time:			

7.2.5 SPIRE SAFE Switch Off

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

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

Enter Start Date|Time:			

Step	Description	Parameter - Unit	Expected value before/after	Actual value before/after
1.	Execute Procedures: ▪ SPIRE-IST-COLD-PDET-OFF-P/R ▪ SPIRE-IST-COLD-BSM-OFF-P/R	PLIABITSAT PSWJFETSTAT PMLWJFETSTAT CHOPSENSPWR JIGGSENSPWR	**- / 0** **- / 0** **- / 0** **- / 0** **- / 0**	
2.	Execute Procedures: ▪ SPIRE-IST-COLD-SDET-OFF-P/R ▪ SPIRE-IST-COLD-SMEC-OFF-P/R	SLIABITSAT SPECJFETSTAT SMECENCPWR SMECLVDTPWR	**- / 0** **- / 0** **- / 0** **- / 0**	
3.	Execute Procedures: ▪ SPIRE-IST-COLD-MCU-OFF-P/R ▪ SPIRE-IST-COLD-SCU-OFF-P/R	MCUBITSTAT SCUTEMPSTAT SUBKSTAT	**- / 0** **- / 0** **- / 0**	

Enter Date/Time:			Sign Off:	

8 Summary Sheets

8.1 Procedure Variation Summary

	Test Change	Curr. No.: Date Page of

Test designation	Test Procedure	Issue	Rev.
Test step changed	Reason for Change		

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

Table 8.1-1: Procedure Variation Sheet

8.2 Non Conformance Report (NCR) Summary

NCR - No.	NCR - Title	Date	Open Closed	PA sig.

Table 8.2-1: Non-Conformance Record Sheet

8.3 Sign-off Sheet

	Date	Signature
Test Director		
Operator		
PA Responsible		
ESA Representative		

APPENDIX 1

Actual SCOE cable connection (to be confirmed by AIT)

SCOE CABLES CONNECTION to HERSCHEL S/C					
SKIN-01	PWR Panel (PCDU)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	BS Nom Power	SK01BJ09	PCDU	BS SCOE Cable Plugged	
	BS Red Power	SK01BJ10	PCDU	BS SCOE Cable Plugged	
	BDR1 AIT	SK01BJ11	PCDU	LPS SCOE Cable Plugged	
	BDR2 AIT	SK01BJ12	PCDU	LPS SCOE Cable Plugged	
	SA Nom Power	SK01AJ01	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ02	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ03	PCDU	POWER SCOE Cable Plugged	
	SA Nom Power	SK01AJ04	Battery	EMC Dust Cap	
	SA Red Power	SK01AJ05	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ06	PCDU	POWER SCOE Cable Plugged	
	SA Red Power	SK01AJ07	PCDU	POWER SCOE Cable Plugged	
SKIN-02	PWR Panel (ACC, CDMU, RCS, 1553 & Thruster)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-02	DMS 1553 Bus_A	J01	CDMU	Bus Monitor Cable Plugged	
SKIN-02	DMS 1553 Bus_B	J02	CDMU	Bus Monitor Cable Plugged	
SKIN-02	ACMS 1553 Bus_A	J03	ACC	ACMS SCOE Cable Plugged	
SKIN-02	ACMS 1553 Bus_B	J04	ACC	ACMS SCOE Cable Plugged	
SKIN-02	LV1/FCV 20N CMD S/A M	J05	ACC/RCS	ACMS SCOE Cable Plugged	

SKIN-02	LV2/FCV 20N CMD S/A R	J06	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	RCS Press/Tank Temp/PT Pwr	J07	ACC/PT&TH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster Temp M/LV1 Sts	J08	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	CDMU and ACC EEPROM reprogramming input	J09	ACC/CDMU		Flight Plug SK02P09 Plugged
SKIN-02	CDMU and ACC EEPROM reprogramming input	J10	ACC/CDMU		Flight Plug SK02P10 Plugged
SKIN-02	Thruster Temp R/LV2 Sts	J11	ACC/RCS	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters M	J12	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Thruster C/B Heaters R	J13	ACC/CBH	ACMS SCOE Cable Plugged	
SKIN-02	Str1/2 On/Off Cmd M/Str1 Sts	J14	ACC/STR-1		ACMS Flight Plug SK02P14 Plugged
SKIN-02	Str1/2 On/Off Cmd R/Str2 Sts	J15	ACC/STR-2		ACMS Flight Plug SK02P15 Plugged
SKIN-02	Gyro A On/Off Cmd	J16	ACC/GYRO-E1		ACMS Flight Plug SK02P16 Plugged
SKIN-02	Gyro B On/Off Cmd	J17	ACC/GYRO-E2		ACMS Flight Plug SK02P17 Plugged
SKIN-03	TTC Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-03	Test point TC + protection jumper EPC1	SK03J01	XPND1/EPC1		Plastic cap
SKIN-03	Test point TC + protection jumper EPC2	SK03J02	XPND2/EPC2		Plastic cap
	RF LINK				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
	RF link for antenna LGA1	N/A	LGA1	RF SCOE LGA1 Plugged	LGA1 Anechoic Cap
	RF link for antenna LGA2	N/A	LGA2	RF SCOE LGA2 Plugged	LGA2 Anechoic Cap
	RF link for antenna MGA	N/A	MGA	RF SCOE MGA Plugged	MGA Anechoic Cap
SKIN-04	ACMS Panel (RWE)				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-04	RWL1 Sgn	J01	ACC/RWL-1		ACMS Flight Plug SK04P01 Plugged
SKIN-04	RWL2 Sgn	J02	ACC/RWL-2		ACMS Flight Plug SK04P02 Plugged

SKIN-04	RWL3 Sgn	J03	ACC/RWL-3		ACMS Flight Plug SK04P03 Plugged
SKIN-04	RWL4 Sgn	J04	ACC/RWL-4		ACMS Flight Plug SK04P04 Plugged
SKIN-05	GYR/QRS Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-05	CRS1 AOCS Sgn	J01	CRS-1/ACC		ACMS Flight Plug
SKIN-05	CRS2 AOCS Sgn	J02	CRS-2/ACC		ACMS Flight Plug
SKIN-05	GYRO RS422 / Test	J03	GYRO	ACMS SCOE Cable Plugged	
SKIN-05	CRS 1/2 Stimuli	J04	CRS-1,2	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn M	J05	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn M	J06	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	SAS1/2 Sgn R	J07	SAS/ACC	ACMS SCOE Cable Plugged	
SKIN-05	AAD Sgn R	J08	AAD/ACC	ACMS SCOE Cable Plugged	
SKIN-06	STR Panel				
	Connector Function	Skin Connector	S/C unit	SCOE CABLE	Flight Connector
SKIN-06	STR1 Stimuli	J01	STR1	ACMS SCOE Cable Plugged	
SKIN-06	STR2 Stimuli	J02	STR2	ACMS SCOE Cable Plugged	
	UMBILICAL				
	Connector Function	Connector	S/C unit	SCOE CABLE	
	Power/Data	HU1J01	SYSTEM	SCOEs cable Plugged	
	Power/Data	HU2J01	SYSTEM	SCOEs cable Plugged	

END OF DOCUMENT

	Name	Dep./Comp.		Name	Dep./Comp.
	Baldock Richard	FAE12	X	Sonn Nico	ASG51
	Barlage Bernhard	AED13		Steininger Eric	AED321
	Bayer Thomas	ASA42	X	Stritter Rene	AED11
	Brune Holger	ASA45		Suess Rudi	OTN/ASA44
	Chen Bing	HE Space	X	Theunissen Martijn	DSSA
	Davis William	Captec		Vascotto Riccardo	HE Space
	Edelhoff Dirk	AED21		Wagner Klaus	ASG23
	Fehringer Alexander	ASG15	X	Wietbrock Walter	AET12
X	Fricke Wolfgang Dr.	AED 65		Wöhler Hans	ASG23
	Geiger Hermann	ASA42		Wössner Ulrich	ASE252
	Grasl Andreas	OTN/ASA44		Zumstein Armin	AED15
	Grasshoff Brigitte	AET12			
X	Hamer Simon	Terma			
	Hanka, Erhard	FI522			
	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			
	Idler Siegmund	AED312			
	Ivády von András	FAE12			
	Jahn Gerd Dr.	ASG23			
	Jolk Matthias	AET1	X	ESA/ESTEC	ESA
	Klenke Uwe	ASG72	X	Thales Alenia Space Cannes	TAS-F
X	Kölle Markus	ASA43		Thales Alenia Space Torino	TAS-I
	König Werner	AET32			
X	Koppe Axel	AED312			
X	Kroeker Jürgen	AED65		**Instruments:**	
X	La Gioia Valentina	Terma		MPE (PACS)	MPE
	Lang Jürgen	ASE252	X	RAL (SPIRE)	RAL
	Langenstein Rolf	AED15		SRON (HIFI)	SRON
	Langfermann Michael	ASA41			
	Leitermann Stefan	AET12			
	Liberatore Danilo	Rhea		**Subcontractors:**	
X	Martin Olivier	Altec		Austrian Aerospace	AAE
X	Maukisch Jan	ASA43		Austrian Aerospace	AAEM
X	Much Christoph	ASA43		BOC Edwards	BOCE
X	Müller Martin	ASA43		Dutch Space Solar Arrays	DSSA
	Pietroboni Karin	AED65		EADS Astrium Sub-Subsyst. & Equipment	ASSE
	Reichle Konrad	ASA42		EADS CASA Espacio	CASA
	Runge Axel	OTN/ASA44		EADS CASA Espacio	ECAS
	Saal Christoph	External		European Test Services	ETS
	Schink Dietmar	AED321		Patria New Technologies Oy	PANT
	Schmidt Thomas	AED15		SENER Ingenieria SA	SEN
	Schweickert Gunn	ASG23		Thales Alenia Space, Antwerp	TAS-ETCA