Introduction

This document describes the STM2 procedures to be executed on the *cold* SPIRE CQM at ESTEC by SPIRE EGSE staff during the STM2 Tests. This document gives step-by-step instructions on how to execute each procedure and should be used together with AD1 or AD2 when applicable.

Scope

This document can be used for both the Straylight and EMC tests during the STM2 tests as it contains procedures relevant for both.

Change Record

Issue 1.0 – First version.

Applicable Documents

AD1 SPIRE IMT (STM2) sequence for EQM testing, SPIRE-RAL-NOT-002284, Issue 2.1, 5th Oct 2006
AD2 SPIRE STM2 EMC Test Procedure, TEC-EEE/2006.62/FM Issue 2.3 5th October 2006

Reference Documents

RD01 SPIRE Functional Test Specification - SPIRE-RAL-DOC-001652
RD02 SPIRE Short Functional Test (SFT) Procedures for STM2 Tests, SPIRE-RAL-PRC-002729 Issue 1.0, 06/10/2006

General instructions for executing test procedures

- The procedures listed here are not necessarily in the order in which they are expected to be performed. For the exact order of the STM2s please refer to AD1 or AD2.

- When executing AD1 refer to the present document for a detailed test procedure execution.

- The procedure tables include blank boxes where the actual values of parameters can be noted. Based on the comparison with the expected values the success or failure of a step should be recorded in the final column of the table.

- The last row in a procedure table should be used to record the overall Pass/Fail result of each test.

- Contingency actions may be defined within each procedure, if so the appropriate steps will be highlighted in red.

General prerequisites for executing the STM2 procedures

Hardware:

- FPU is integrated onto HOB
- Warm Electronics integrated with CCE
- WE integrated with harness and FPU
- Warm SFTs done in accordance with RD02
- Cold SFTs done in accordance with RD02
- Cold functional test done at "4K" and "1.7K" as per RD02

EGSE:

On HOSQLA4-1 the following applications were running/ installed:

- Router and Gateway are running.
- SPIRE build of the HCSS and QLA installed.
- Test Database has been created on data server.
- Test Control Server is running.
- Telemetry ingestion is running.
- Packet Display running.
- QLA running and connected to the router.

On HOSS2K4-2 the following applications were running/ installed:

- SCOS is running on I-EGSE.
- Manual Stack Task started on SCOS
- TOPE is running

On CDSM Simulator workstation the following applications were running/ installed:

- CDMS Simulator executable is installed.
- CDMS Simulator is running. SPIRE Nominal Bus List selected.

SPIRE Nominal Settings (as per CQM instrument)

Note: this may change following STM2 data analysis

Photometer:

Photometer Setting	Value
Phot Bias Frequency	130.2 Hz
Phot Sampling Frequency	18.6 Hz
PSW Bias Amplitude	16.47 mV
PMW Bias Amplitude	16.47 mV
PLW Bias Amplitude	16.47 mV
PSW Phase	168º
PMW Phase	168º
PLW Phase	168º

Note1:
The PSW, PMW related parameters are noted here just for completeness as these arrays are not present on the CQM instrument.

Note2:
During EQM campaign it was decided to speed up the PLW frame generation rate by setting 43.3 Hz as sampling rate on the photometer. This, although a valid configuration will generate events when resetting the offsets, 43.3 Hz. This is just a note on the expected behaviour if the sampling rate is set to 43.3Hz. 43.3 Hz can still be used properly.

Spectrometer:

Spectrometer Setting	Value
Spec Bias Frequency	160.0 Hz
Spec Sampling Frequency	80.0 Hz
SSW Bias Amplitude	16.47 mV
SLW Bias Amplitude	16.47 mV
SSW Phase	168º
SLW Phase	168º

Note:
These values are noted here just for completeness as there are no spectrometer arrays on the CQM instrument.

Procedure: SPIRE-STM2-SETUP-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Setup the DCU frame generation for a particular bias and sampling frequencies
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DCU PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to select appropriate bias frequency, amplitude and phase settings* Execute TCL script SPIRE-STM2-SETUP-P.tcl				
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-START-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Start the DCU frame generation and set a new OBSID
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DCU PARAMETERS display is selected on SCOS

Initial Configuration:
- SPIRE is in PHOTSTBY mode
- Data is not being generated
- OBSID is Null.

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to select appropriate type of frames to generate.* Execute TCL script SPIRE-STM2-START-P.tcl	DCUFRAMESTAT OBSID	OFF/ CONTINUOUS Null/ $OBSID		
Test Result (Pass/Fail):					

Final Configuration:
- SPIRE is in PHOTSTBY-TEST mode
- Selected frames are being generated
- OBSID is set.

Procedure: SPIRE-STM2-STOP-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Stop the DCU frame generation and clear OBSID
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DCU PARAMETERS display is selected on SCOS

Initial Configuration:
- SPIRE is in PHOTSTBY-TEST mode
- Selected frames are being generated
- OBSID is set.

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-STOP-P.tcl	DCUFRAMESTAT OBSID	CONTINUOUS/ OFF $OBSID/Null		
Test Result (Pass/Fail):					

Final Configuration:
- SPIRE is in PHOTSTBY mode
- Data is not being generated
- OBSID is Null.

Procedure: SPIRE-STM2-NOMINAL-BIAS-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Set the nominal bias on the photometer detectors and reset offsets
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DCU PARAMETERS display is selected on SCOS

Initial Configuration:
- SPIRE is in PHOTSTBY mode
- PLW Bias is not nominal

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-NOMINAL-BIAS-P.tcl	PLWBIAS - mV	/16.5		
Test Result (Pass/Fail):					

Final Configuration:
- SPIRE is in PHOTSTBY mode
- PLW Bias is set to nominal

Procedure: SPIRE-STM2-NOISE-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Check the noise in PLW JFETs with shorted inputs versus Vss (detectors at ~2K)
Duration: ~ 30 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are off
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in DRCU_ON mode

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-PDET-ON.tcl	SCUDCDCSTAT PLWJFETSTAT PLWJFET1V PLWJFET2V MODE	0/1 0/0x30 0/-1.49V 0/-1.49V DRCU_ON/ PHOTSTBY		
2	If step 2 is a success, execute TCL script SPIRE-STM2-NOISE-P.tcl				
3	**Contingency:** If step 2 is a failure then execute contingency steps 4 and 5				
4	Execute TCL script SPIRE-STM2-PDET-OFF-P.tcl.				
5	Execute TCL script SPIRE-STM2-PDET-ON.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: SPIRE mode PHOTSTBY

SPIRE Procedure	Ref: SPIRE-RAL-PRC-002746
	Issue: 1.0
	Date: 13/10/06

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Procedure: SPIRE-STM2-NOISEVBIAS-S
Version: 1.0
Date: 12th Oct 2006
Purpose: Measure noise versus bias using Spectrometer side and STM JFETS
Duration: ~ 30 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The STM JFETs are off
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in DRCU_ON mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/Fail
1	Execute TCL script SPIRE-STM2-SDET-ON.tcl	MODE	DRCU_ON/ SPECSTBY		
2	Execute TCL script SPIRE-STM2-NOISEVBIAS-S.tcl	—	—	—	
3	Execute TCL script SPIRE-STM2-SDET-OFF.tcl	MODE	SPECSTBY/ DRCU_ON		
Test Result (Pass/Fail):					

Final Configuration: SPIRE is in DRCU_ON mode

Procedure: SPIRE-STM2-PUMP-CHAR
Version: 1.1
Date: 23rd Sep. 2005
Purpose: Cooler sorption pump characterisation test
Duration: ~ 1.5 hours

Preconditions:
- **SCU DC and AC thermometry is on**
- **Level 0 Detector Box and Pump are at 2 K and the Level 0 Evaporator is at 1.85 K**

Initial Configuration:
- SPIRE DPU is on and generating HK
- SCU PARAMETERS display is selected on SCOS
- SPIRE is in DRCU_ON mode

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-STM2-START-TEST.tcl				
2	From the SCOS MSTK send the TC: **0xA0C70339** *40 mW power applied to Pump Heater & Evaporator Heat Switch turned on.*	SPHSV SPHTRV	~565 mV ~ 4 V		
3	Wait for pump temperature to stabilize	PUMPHTRTEMP	—	—	
4	Execute TCL script SPIRE-STM2-END-TEST.tcl	PUMPHTRTEMP	—		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-CREC
Version: 1.0
Date: 12th Oct 2006
Purpose: Manual Cooler Recycle
Duration: ~ 2 hours

Preconditions:
- **SCU DC and AC thermometry is on**
- **Level 0 Detector Box and Pump are at 2 K and the Level 0 Evaporator is at 1.85 K**

Initial Configuration:
- SPIRE DPU is on and generating HK
- SCU PARAMETERS display is selected on SCOS

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-STM2-CREC.tcl • Click on OK button to turn off Pump Heat Switch (whether it is on or off) • Apply 1.4 mA to the Evaporator Heat Switch	STEP *Time (UT)* SPHSV PUMPHSTEMP EVAPHSTEMP	1 - ~ 565 mV - ~ 3.0 K		
2	Wait for PUMPHSTEMP to go just below 12 K and then click on OK to apply 300 mW power to Pump Heater	STEP *Time (UT)* *ΔTime (minutes)* SPHTRV	2 - ~ 10.8 V		
3	Wait for PUMPHTRTEMP to increase to 45 K and then click on OK to reduce power to Pump Heater to 40mW	STEP *Time (UT)* *ΔTime (minutes)* SPHTRV PUMPHTRTEMP	3 - ~ 4 V ~ 45 K		
4	Wait for SUBKTEMP to fall below 2 K and then click on OK to switch off power to the Pump Heater and Evaporator Heat Switch. IMPORTANT: This step should be executed even if SUBKTEMP is above 2 K but more than an hour has elapsed since the start of the recycle procedure.	STEP *Time (UT)* *ΔTime (minutes)* SPHSV SPHTRV PUMPHSTEMP EVAPHSTEMP	4 - ~ 0 mV ~ 0 V ~ 4.1 K ~ 19.3 K		
5	Wait for EVAPHSTEMP to fall	STEP	5		

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	below ~ 16 K and then click on OK to switch on power to the Pump Heat Switch *The TCL script ends after execution of this step*	*Time (UT)* *ΔTime (minutes)* EVHSV SUBKTEMP PUMPHSTEMP	- ~565 mV ~1.9 K ~13 K		
6	Monitor SUBKTEMP and PUMPHSTEMP. *Cooler recycle procedure completes when SUBKTEMP reaches ~ 0.285 K and PUMPHSTEMP reaches ~16.5 K.*	*Time (UT)* *ΔTime (minutes)* SUBKTEMP PUMPHSTEMP	- ~ 0.285 K ~16.5 K		
Test Result (Pass/Fail):					
Actual Duration of SPIRE Cooler Recycle Procedure:					

Final Configuration: Cooler recycled

Procedure: SPIRE-STM2-PHOTSTBY
Version: 1.0
Date: 12th Oct 2006
Purpose: Switch on the Photometer detectors and reset offsets.
Duration: ~ 10 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are off
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in DRCU_ON mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-PDET-ON-STEP1.tcl	SCUDCDCSTAT PLWJFETSTAT PLWJFET1V PLWJFET2V MODE	0/1 0/0x30 0/-1.49V 0/-1.49V DRCU_ON/ PHOTSTBY		
2	If step 2 is a success, execute TCL script SPIRE-STM2-NOMINAL-BIAS-P.tcl				
3	**Contingency:** If step 2 is a failure then execute steps 4 and 5				
4	Execute TCL script SPIRE-STM2-PDET-OFF.tcl.				
5	Execute TCL script SPIRE-STM2-PDET-ON.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: SPIRE mode PHOTSTBY

Procedure: SPIRE-STM2-DNA-P
Version: 1.0
Date: 12th Oct 2006
Purpose: To determine Photometer noise versus bias level and frequency
Duration: ~ 4 hours maximum

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to select appropriate bias frequency, amplitude and phase settings* Execute TCL script SPIRE-STM2-SETUP-P.tcl				
2	Execute TCL script SPIRE-STM2-PHASEUP-P.tcl				
3	Execute TCL script SPIRE-STM2-GET-P.tcl	—	—	—	
4	Repeat steps1-3 for as many bias frequencies as required.				
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-PHASEUP-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Phase up to maximise signal. Note that this test will probably have to be repeated 2-3 times in succession to optimise the phase.
Duration: ~ 30 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/Fail
1	Execute TCL script SPIRE-STM2-PHASEUP-P.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-LC-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Load curve at fixed frequency and phase
Duration: ~ 15 minutes (TBC)

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to select appropriate frequency and phase settings* Execute TCL script SPIRE-STM2-LC-P.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-LC-PLUS90-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Load curve at fixed frequency and phase + 90°
Duration: ~ 15 minutes (TBC)

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to change phase settings* Execute TCL script SPIRE-STM2-LC-P.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-LC-MINUS90-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Load curve at fixed frequency and phase - 90°
Duration: ~ 15 minutes (TBC)

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	*Use the input parameters to change phase settings* Execute TCL script SPIRE-STM2-LC-P.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-SET-BIAS-AMPL-P
Version: 1.0
Date: 12th Oct 2006
Purpose: Set optimum bias for Photometer detectors and reset offsets
Duration: ~ 5 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-SET-BIAS-AMPL-P.tcl	PLWBIAS	-/selected bias		
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-PCAL-LEVEL
Version: 1.0
Date: 12th Oct 2006
Purpose: Run PCAL static test to check calibration. Different PCAL levels to check which is optimum for given instrument configuration.
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-PCAL-LEVEL.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-LOAD-COMMAND-LIST
Version: 1.0
Date: 12th Oct 2006
Purpose: Load Command Lists for SPIRE PCAL flashes
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-LOAD-COMMAND-LIST.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-PCAL-FLASH
Version: 1.0
Date: 12th Oct 2006
Purpose: Run PCAL Flash
Duration: ~ 15 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script SPIRE-STM2-PCAL-FLASH.tcl	—	—	—	
Test Result (Pass/Fail):					

Final Configuration: Unchanged

Procedure: SPIRE-STM2-RESET-PHOT-OFFSETS
Version: 1.0
Date: 12th Oct 2006
Purpose: To reset the photometer offsets automatically assigning a unique obsid
Duration: ~ 2 minutes

Preconditions:
- SCU AC and DC thermometry is on
- The Photometer detectors are on
- DPU and OBS PARAMETERS display is selected on SCOS

Initial Configuration: SPIRE is in PHOTSTBY mode

Procedure Steps:

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute script SPIRE-STM2-RESET-PHOT-OFFSETS.tcl				
2	Verify the reset has been effective				
Test Result (Pass/Fail):					

Final Configuration: SPIRE is in is in PHOTSTBY mode