SPIRE OBCP Trigger Test Procedures for IST

SPIRE-RAL-PRC-003038
Issue 1.1
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Approved by:

Glossary

AOT	Astronomical Observation Template
BSM	Beam Steering Mirror
CCB	Configuration and Control Board
DTCP	Daily Telecommunication Period
ICC	Instrument Control Centre
ILT	Instrument Level Test
IST	Integrated System Test
LEOP	Launch and Early Orbit Phase
LVDT	Linear Voltage Displacement Transducer
MOC	Mission Operations Centre
MOIS	Mission Operation Information System
MTL	Mission Time Line
OE	Optical Encoder
OPD	Optical Path Difference
PID	Proportional, Integral & Differential (control parameters)
PTC	Photometer Thermal Control
PV	Performance Verification
SMEC	Spectrometer Mechanism
SPIRE	Spectral and Photometric Imaging Receiver
SPT	System Performance Test
PTC	Photometer Thermal Control
PV	Performance Verification
SCOM	SpaceCraft Operations Manager
TBC	To Be Confirmed
TBD	To Be Determined
TBS	To Be Specified
ZPD	Zero Path Difference

1. INTRODUCTION

The purpose of these tests is to check the triggering of spacecraft OBCPs as a result of the instrument generating TM(5,2) exception reports for various instrument anomalies. Four such tests are proposed and the On-board software will generate the following exceptions:

- DPU Anomaly
- DRCU Anomaly
- Observation Anomaly
- Observation Anomaly Corrected

For each test the following steps will be executed

- Execute a standalone TCL script from the CCS. This script runs SPIRE commands which generate the required exception report. The script will wait for a time specified in the test and then issue the required event packet.
- On reception of the exception report the appropriate S/C OBCP is triggered.
- The OBCP trigger and execution are monitored.

Procedures are also included for the S/C OBCPs which switch SPIRE OFF in a controlled sequence and for switching SPIRE into Standby mode from an operational mode.

1.1 References

1.1.1 Applicable Documents

AD01	IID Part A (SCI-PT-IIDA-04624), Issue 3.3
AD02	SPIRE Data ICD (SPIRE-RAL-PRJ-001078), Issue 2.1, 12th July 2007
AD03	SPIRE OBS Upload Procedure (SPIRE-RAL-PRC-002866), Issue 1.2, 6th Feb 2008
AD04	Payload Management & OBCP (H-P-1-ASP-TN-1072), Issue 4, 20/01/2007 [sic - should be 20/01/2008]

1.1.2 Reference Documents

RD01	IID Part B (SCI-PT-IIDB-02124), Issue 3.3
RD02	Herschel IST Test Case 'Test of Instrument FDIR OBCP', HP-2-ASED-TP-0197, Issue 1.0, 12th February 2008

1.1.3 Change Record

ISSUE	DATE	
Issue 1	14th February 2008	First Version
Issue 1.1	26th February 2008	

2. TEST SPECIFICATION

2.1 Prerequisites

- OBS 2.2.H has been uploaded and written to the EEPROM in accordance with AD03.
- The HPSDB on the CCS includes SPIRE MIB 2.2.H1_PR_20Feb2008
- The CCS/I-EGSE communication link is active so that test TM can be received on the I-EGSE

2.2 Test Procedures

The procedures are designed to be executed in the order given below. The sequence is valid for both SPIRE Prime and Redundant instrument.

2.2.1 Procedure: SPIRE-OBSERVATION-ANOMALY

Version: 1.0
Date: 16th Feb 2008

Purpose:
Trigger the S/C OBCP DB_OBCP_H_SPIRE_OPE_STOP to stop SPIRE operations in the case of an anomaly.

Duration:
~2 minutes to raise the exception

Preconditions:

- SPIRE DPU is ON and generating nominal and critical HK. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-OFF2DPUON.tcl, v 1.1 2007/11/30
- SPIRE DRCU is switched on. This is assumed to have been done executing TCL script SPIRE-IST-DBG-DPUON2STBY.tcl,v 1.1 2007/11/30
- SPIRE is in PHOTOPS operational mode. This is assumed to have been done executing TCL script SPIRE-IST-DBG-STBY2OPS.tcl,v 1.1 2007/11/30

Initial Configuration:

- SPIRE is in PHOTOPS mode
- Nominal and critical HK data are being generated
- Photometer science data are being generated

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-ObservationAnomaly.tcl • **Wait for ~5 seconds for the reception of TM(5,2) event report with Event ID 0xC100 and SID 0x5200** *The reception of this event should trigger the S/C OBCP to abort the current sub-schedule and stop SPIRE operations.*	Event ID SID	0xC100 0x5200		

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	The OBCP should leave the DRCU and DPU switched on.				
2	**Check that SPIRE operations have stopped.**				

Final Configuration:

- SPIRE DRCU is powered ON
- SPIRE DPU is on and generating nominal and critical HK

2.2.2 Procedure: SPIRE-OBSERVATION-ANOMALY-CORRECTED

Version: 1.0
Date: 16th Feb 2008

Purpose:
Trigger the S/C OBCP DB_OBCP_H_SPIRE_OPE_RESUME to resume SPIRE operations after an anomaly has been resolved.

Duration:
~2 minutes to raise the exception

Preconditions:
- Procedure SPIRE-OBSERVATION-ANOMALY has been executed beforehand

Initial Configuration:
- SPIRE DRCU is powered ON
- SPIRE DPU is on and generating nominal and critical HK

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-ObservationAnomalyCorrected.tcl • **Wait for ~5 seconds for the reception of TM(5,2) event report with Event ID 0xC110 and SID 0x5200** *The reception of this event should trigger the S/C OBCP to resume SPIRE operations by starting from the next sub-schedule*	Event ID SID	0xC110 0x5200		
2	**Check that the OBCP to resume SPIRE operations has been executed successfully**				

Final Configuration:
- SPIRE DRCU is powered ON
- SPIRE DPU is on and generating nominal and critical HK
- SPIRE is in PHOTOPS mode

- Photometer science data are being generated

2.2.3 Procedure: SPIRE-DRCU-ANOMALY

Version: 1.0
Date: 16th Feb 2008

Purpose:
Trigger the S/C OBCP DB_OBCP_H_SPIRE_DRCU_OFF to switch off the DRCU in the case of an anomaly.

Duration:
~2 minutes to raise the exception

Preconditions:

- SPIRE DPU is ON and generating nominal and critical HK. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-OFF2DPUON.tcl, v 1.1 2007/11/30

- SPIRE DRCU is switched on. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-DPUON2STBY.tcl,v 1.1 2007/11/30

Initial Configuration:
SPIRE is in REDY mode and generating nominal and critical HK

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-DRCUAnomaly.tcl • **Wait for ~5 seconds for the reception of TM(5,2) event report with Event ID 0xC000 and SID 0x5200** *The reception of this event should trigger the S/C OBCP to switch off the DRCU* *The OBCP should switch off the DRCU but leave the DPU on and generating nominal and critical HK*	Event ID SID	0xC000 0x5200		

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
2	• **Check that the DRCU has been powered off** • **Check that the nominal and critical HK report generation is still in progress**				

Final Configuration:

- SPIRE DRCU is powered OFF
- SPIRE DPU is on and generating nominal and critical HK

2.2.4 Procedure: SPIRE-DPU-ANOMALY

Version: 1.0
Date: 16th Feb 2008

Purpose:
Trigger the S/C OBCP DB_OBCP_H_SPIRE_OFF to switch off the DPU in the case of an anomaly.

Duration:
~2 minutes to raise the exception

Preconditions:

- SPIRE DPU is ON and generating nominal and critical HK. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-OFF2DPUON.tcl, v 1.1 2007/11/30
- SPIRE DRCU is switched on. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-DPUON2STBY.tcl,v 1.1 2007/11/30

Initial Configuration:
SPIRE is in REDY mode and generating nominal and critical HK

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-DPUAnomaly.tcl • **Wait for ~5 seconds for the reception of TM(5,2) event report with Event ID 0xC010 and SID 0x5200** *The reception of this event should trigger the S/C OBCP to switch off the DRCU & DPU* *The OBCP should stop the nominal and critical HK report generation and switch off the DPU*	Event ID SID	0xC010 0x5200		
2	• **Check that the**				

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	nominal and critical HK report generation has stopped • **Check that the DRCU has been powered off** • **Check that the DPU has been powered off**				

Final Configuration:
SPIRE DPU and DRCU are powered OFF

2.2.5 Procedure: SPIRE-OBCP-OFF-CTRL

Version: 1.0
Date: 16th Feb 2008

Purpose:
Controlled switch off of SPIRE using the S/C OBCP DB_OBCP_H_SPIRE_OFF_CTRL.

Duration:
~5 minutes to start of OBCP

Preconditions:

- SPIRE DPU is ON and generating nominal and critical HK. This is assumed to have been done by executing TCL script SPIRE-IST-DBG-OFF2DPUON.tcl, v 1.1 2007/11/30
- SPIRE DRCU is switched on. This is assumed to have been done by TCL script SPIRE-IST-DBG-DPUON2STBY.tcl,v 1.1 2007/11/30
- SPIRE is in PHOTOPS operational mode. This is assumed to have been done by TCL script SPIRE-IST-DBG-STBY2OPS.tcl,v 1.1 2007/11/30

Initial Configuration:

- SPIRE is in PHOTOPS mode
- Nominal and critical HK data are being generated
- Photometer science data are being generated

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-OFFCTRL.tcl Script function: • stop Photometer science data • start nominal HK generation from 1Hz to 0.25Hz • switch off the MCU • define SAFE mode table A TM(5,4) event packet with Event ID 0x550D and SID 0x5420 is expected following MCU switch off. Its reception is normal and does not indicate a problem.				
2	**Now execute the S/C OBCP**				

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
	DB_OBCP_H_SPIRE_OFF_CTRL				
3	Note that the 4 TCs to stop currently running VMs are expected to fail with failure code 0x080A – VM not running. The reception of these TM(1,8) packets does not indicate a problem.				
4	**Wait ~30 seconds for the TC to run the VM to put SPIRE into SAFE mode.**				
5	**Check that the MODE parameter on the DPU & OBS PARAMETERS display is set to SAFE (TBC)** *The operationl SAFE mode VM will also clear the HK afterwards (NYI).*	MODE	SAFE (TBC)		
6	**Check that both the SPIRE DRCU and DPU have been switched off as specified in the OBCP.**				

Final Configuration:
SPIRE DRCU and DPU are powered OFF

2.2.6 Procedure: SPIRE-OBCP-STANDBY

Version: 1.0
Date: 16th Feb 2008

Purpose:
Put SPIRE in Standby mode using the S/C OBCP DB_OBCP_H_SPIRE_STBY.

Duration:
20 minutes

Preconditions:

- SPIRE DPU is ON and generating nominal and critical HK. This should be done by executing TCL script SPIRE-IST-DBG-OFF2DPUON.tcl, v 1.1 2007/11/30
- SPIRE DRCU is switched on. This should be done executing TCL script SPIRE-IST-DBG-DPUON2STBY.tcl,v 1.1 2007/11/30
- SPIRE is in PHOTOPS operational mode. This should be done executing TCL script SPIRE-IST-DBG-STBY2OPS.tcl,v 1.1 2007/11/30

Initial Configuration:

- SPIRE is in PHOTOPS mode
- Nominal and critical HK data are being generated at 1Hz and 0.5Hz respectively
- Photometer science data are being generated

Procedure Steps:

Step	Description	Parameters	Expected Values	Actual Values	Success/ Failure
1	Execute TCL script SPIRE-OBCPTest-STANDBY.tcl **Allow ~30 seconds for the script to execute.**				
2	**Check that the MODE parameter on the DPU & OBS PARAMETERS display is set to REDY (TBC)**	MODE	REDY (TBC)		
3	**Now the S/C OBCP DB_OBCP_H_SPIRE_ can be executed**				

Final Configuration:

- SPIRE is in REDY mode
- Nominal and critical HK data are being generated at 0.25Hz and 0.5Hz respectively

- Photometer science data generation has stopped

- End of Document -