1. INTRODUCTION

This document reports the results of the execution of several instantiated AOTs during the PFM3 test campaign.

AOTs define the way in which the different types of SPIRE observations are implemented. They are defined using the Herschel Common Uplink System (CUS), which converts user input into a sequence of satellite and instrument commands with appropriate timing. These command sequences use both simple DRCU commands and Command Lists defined specifically for SPIRE observations. One purpose of these tests was to execute as many different AOT types as possible in order to determine if the command sequence and timing was correct, and to exercise the Command Lists used.

For each AOT tested the user inputs were taken from the relevant section of RD01 and the command sequence generated was executed by the instrument.

1.1 Scope

The purpose of this test was

- To execute as many different instantiated AOT types as possible in order to confirm correct command sequencing and timing, and correct execution of command lists. (*This was limited by both the number of AOTs defined at the time and the instrument operational modes previously verified*)
- To generate data for testing the latest version of the SPIRE pipeline (version 0.3). (*This was limited to baseline operational modes only*)

1.2 Reference Documents

Ref	Document	Name	Version/Issue No.
RD01		SPIRE AOT Test Plan (SPIRE-RAL-DOC_002720)	Issue 0.2
RD02		SPIRE Instrument User Manual (SPIRE-RAL-PRJ-002395)	Issue 1.0

1.3 Change Record

Document	Change date	Changes
Issue 1.0	**22/08/06**	First Version

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2. SUMMARY OF AOT TESTS

2.1 Instrument Configuration

- All tests start with the instrument in the appropriate standby mode (PHOT_STBY or SPEC_STBY) see RD02. (*Note: During these tests it was not possible to switch on the SCAL. Thus the instrument was not configured completely into the SPEC_STBY mode. This may partially explain the saturation of detectors during spectrometer observations.*)

- All observations have a PCAL flash at the beginning and end (some also have PCAL flashes within the operations)

2.2 Executed AOT Tests

Test Case	Test Purpose	OBSIDs
ILT-OPS-POF2-C	Jiggle Map with source on central pixel	3000E420
ILT-OPS-POF2-D	Jiggle Map with source offset from central pixel	3000E425
ILT-OPS-POF2-Da	Jiggle Map with source offset from central pixel, full ABBA nod cycle	3000E426
ILT-OPS-POF5-A	Scan Map with no PCAL flashes inserted	3000E41C
ILT-OPS-POF5-Aa	Scan Map with PCAL flashes inserted	3000E449, 3000E44A
ILT-OPS-SOF1-B	Point Source Spectrum, High Resolution	3000E440, 3000E444

2.3 AOT Results

Test Case	Result	SPRs Raised
ILT-OPS-POF2-C	• Missing last jiggle cycle data	SPR-0508
	• STEP parameter was always set to 1 for all Nod positions	SPR-0509
	• Non-optimal sampling of the BSM position and detector signal	SPR-0510
	• BSM performance (movement to chop position) was noted as being poor	
ILT-OPS-POF2-D	• Missing last jiggle cycle data	SPR-0508
	• STEP parameter was always set to 1 for all Nod positions	SPR-0509
	• Non-optimal sampling of the BSM position and detector signal	SPR-0510
	• BSM performance (movement to chop position) was noted as being poor	

ILT-OPS-POF2-Da	• Missing last jiggle cycle data	SPR-0508
	• STEP parameter was always set to 1 for all Nod positions	SPR-0509
	• Non-optimal sampling of the BSM position and detector signal	SPR-0510
	• BSM performance (movement to chop position) was noted as being poor	
ILT-OPS-POF5-A	Completed Successfully	
ILT-OPS-POF5-Aa	Completed Successfully	
ILT-OPS-SOF1-B	• Detector data was saturated during the FTS scans.	SPR-0511
	• The last FTS scan did not complete before the reconfiguration of the SMEC	SPR-0512
	• The SMEC hit the mechanical stop at the maximum Optical Path Difference	SPR-0525
	• The scan range used for the high resolution spectral scans runs from the ‘home’ position to maximum OPD – this is inefficient	SPR-0526
All Tests	During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data	SPR-0507

3. DETAILED TEST RESULTS

3.1 7-pnt Jiggle Mapping

3.1.1 Configuration

- The instrument was placed into the PHOT_STBY mode before execution of the AOT
- In order to be able to simulate nodding of the Herschel telescope the movement time between on-source and nodding positions was increased to 3 mins to allow time for the operator to 'move' the input beam. This should have no affect on the data.
- For on-source BBs (Nod position A) the beam was centred on pixel PSWE8 and chopped between PSWE6 and PSWE10. For off-source BBs (Nod position B) the beam was centred on pixel PSWE12 and chopped between PSWE10 and PSWE14

3.1.2 Test Case: ILT-OPS-POF2-C

OBSID: 3000E420

Description: 7-pnt jiggle with one complete jiggle cycle on-source and one at the nod position (i.e AB nodding)
Source (Hot BB) is at the centre of the beam

Results:

- Completed successfully
- BSM performance (movement to chop position) was noted as being poor
- The sampling of the BSM position and detector signal did not seem to be set in the most optimal way:
  - For the detector data, the first sample for each chop half-cycle seemed to be taken too early. This meant that the last point in the previous chop half cycle was very close in time to the first point in the next half-cycle.
  - For the BSM position sampling, there was a gap (~30ms) at the end of each chop half-cycle before the sampling of the next half-cycle started. For the pipeline software, it may make it easier to more accurately pinpoint the moment the BSM changed position if the sampling of BSM was continuous (independent of BSM position).
- The detector timeline in the 7-point jiggle maps correctly shows data for 8 different chop/jiggle positions. However, the BSM timeline does not contain any data giving the BSM position during the last jiggle cycle (only 7 positions are present). These data are completely missing - ie. they were not spuriously placed into a different building block or between building blocks: no packets were received for that position at all.
- The housekeeping STEP parameter was always set to 1 for all Nod positions

- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data.

3.1.3 Test Case: ILT-OPS-POF2-D

OBSID: 3000E425

Description: 7-pnt jiggle with one complete jiggle cycle on-source and one at the nod position (i.e AB nodding)
Source (Hot BB) is offset from the centre of the beam by approximately 0.5 of the PMW beam size

Results:

- Completed successfully
- BSM performance (movement to chop position) was noted as being poor
- Non-optimal sampling of the BSM position and detector signal (see 3.1.2 Test Case: ILT-OPS-POF2-C)
- Missing last jiggle cycle data (see 3.1.2 Test Case: ILT-OPS-POF2-C)
- The housekeeping STEP parameter was always set to 1 for all Nod positions
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data.

3.1.4 Test Case: ILT-OPS-POF2-Da

OBSID: 3000E426

Description: 7-pnt jiggle with one complete jiggle cycle on-source and one at the nod position, repeated twice (i.e ABBA nodding)
Source (Hot BB) is offset from the centre of the beam by approximately 0.5 of the PMW beam size

Results:

- Completed successfully
- BSM performance (movement to chop position) was noted as being poor
- Non-optimal sampling of the BSM position and detector signal (see 3.1.2 Test Case: ILT-OPS-POF2-C)
- Missing last jiggle cycle data (see 3.1.2 Test Case: ILT-OPS-POF2-C)
- The housekeeping STEP parameter was always set to 1 for all Nod positions
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data

3.2 Scan Mapping

3.2.1 Configuration

- The instrument was placed into the PHOT_STBY mode before execution of the AOT
- No movement of the telescope simulator was made so no source is expected to be seen in the map

3.2.2 Test Case: ILT-OPS-POF5-A

OBSID: 3000E41C
Description: Scan Map: 60 arcmin x 40 arcmin, no source in beam
10 scan lines of length 60 armin
Results:
- Completed successfully
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data

3.2.3 Test Case: ILT-OPS-POF5-Aa

OBSID: 3000E449
Description: Scan Map: 180 arcmin x 120 arcmin, no source
30 scan lines of length 180 armin, with a PCAL flash every 8 scan lines
Results:
- Completed successfully
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data

OBSID: 3000E44A
Description: Scan Map: 180 arcmin x 120 arcmin, no source
30 scan lines of length 180 armin, with a PCAL flash every 8 scan lines
Results:
- Completed successfully
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data

3.3 Spectrometer Point Source

3.3.1 Configuration

- The instrument was placed into the SPEC_STBY mode before execution of the AOT

Note: during these observations the last scan did not complete.

3.3.2 Test Case: ILT-OPS-SOF1-B

OBSID: 3000E440
Description: 8 High Resolution FTS scans of Hot BB

Results:

- During these observations the last FTS scan did not complete before the reconfiguration of the SMEC
- The detectors were saturated during the FTS scans. This may be due to the fact that the SCAL was not used to null the Spectrometer signal.
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data

OBSID: 3000E444
Description: 8 High Resolution FTS scans of Hot BB

Results:

- During these observations the last FTS scan did not complete before the reconfiguration of the SMEC
- The detectors were saturated during the FTS scans. This may be due to the fact that the SCAL was not used to null the Spectrometer signal.
- During PCAL Flashes, part of the data from a Building Block (a few samples) is found in the subsequent BB data