EADS astrium

Test Report

Herschel

Title: **SPIRE Final Electrical Integration Test Report**

CI-No: 125 200

Prepared by:	A. Koppe	Date: 17.09.07
Checked by:	S. Idler	18.09.07
Product Assurance:	S. Stritter	19.09.07
Configuration Control:	W. Wietbrock	19.09.07
Project Management:	Dr. W. Fricke	19/09/2007

Distribution: See Distribution List (last page)

Issue	Date	Sheet	Description of Change	Release
1	17.09.2007	All	First issue	

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1 Scope

1.1 Objective

This report describes the final electrical mating of the SPIRE Warm Units, mounted on the closed SVM panel, with the HERSCHEL cryostat which carries the SPIRE FPU and the associated harness. The connecting interfaces are the SIH-IS and SIH-CS at the vacuum feed through, and SIH-IS and SIH-SS at the SVM connector brackets CB 312 100, CB 312 200, CB 312 300, mounted on the SVM upper closure panel.

Note: The SPIRE LPU has neither been integrated nor the required harness modification has been performed.

2 Test Report Summary

2.1 Operations

Execution of step-by-step procedure for mating of the SPIRE SIH-IS and SIH-CS at the vacuum feed through, and SIH-IS and SIH-SS at SVM CB.

2.2 Test Procedure

HP-2-ASED-TP-0166, issue 1

2.3 Procedure Variations

See chapter 10.1 of the as-run procedure

2.4 Non Conformances

None

2.5 Conclusion

The final mating and checkout of the SPIRE FPU and warm Units has been successfully completed.

A quick online assessment of the SPIRE SIH integration test shows very good results and indicates (*as far as the scope of the test is concerned*) that this instrument is healthy. A final report after detailed data analysis will be provided by SPIRE.

This allows to proceed with higher level functional testing (SFT, …) of the SPIRE FM onboard the HERSCHEL S/C.

It should be noted that the LPU is not integrated. Therefore, test steps of chapter 8 and 9 of As-Run Procedure have not been executed. These integration tests will be performed for de-mating and mating of the SIH-SS and SIH-IS in conjunction with the LPU integration. A respective report will than be issued.

Annex 1 AS RUN PROCEDURE

Title:

SPIRE PFM Final Electrical Integration Procedure

CI-No: 125 200

AS RUN PROCEDURE 14.09.07

Prepared by:	A. Koppe & S. Hamer	Date:	10.09.2007
Checked by:	S. Idler		12.09.2007
Product Assurance:	for R. Stritter		12.09.2007
Configuration Control:	W. Wietbrock		12.09.2007
Project Management:	Dr. W. Fricke		12/09/2007

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1	10.09.07	all	Initial issue	

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1 Scope

This document establishes a cover procedure which incorporates the detailed step-by-step procedure, prerequisites and conditions, copied from RD1, to be followed for the final electrical integration of the SPIRE Warm Units and their associated harness on the SVM panel with the SPIRE FPU and its SIH at the CVV CB.
It should be noted that the LPU integration is performed later during the HERSCHEL PFM AIT flow. Therefore, a separate chapter is given for the integration once this unit is available.
The following activities are to be performed:

- Mating of the SIH-IS to CVV-CB and SVM-CB covers the following activities:
    1. The mating of the SIH-IS and SIH-CS harnesses at the CVV-CB vacuum feedthrus
    2. The mating of the SIH-IS and SIH-SS harnesses at the SVM-CB
    3. Integration electrical tests whereby the balance of I_{dd} and I_{ss} for the JFET modules is measured

- De-mating of SIH-IS and SIH-SS for LPU Integration has been included because it is foreseen that the LPU will have to be integrated after initial electrical integration and UFT of SPIRE. This requires that the SIH-SS-11 is de-mated from the SIH-IS-11 and SIH-SS-13 is de-mated from the SIH-IS-13 at the SVM-CB and the SPIRE SVM panel is opened.

- Step by Step Procedure for Mating of SIH-IS and SIH-SS after LPU Integration has been included to document the procedure for the final mating of the SIH-SS-XX and SIH-IS-XX after integration and test of the LPU.

2 Documents/Drawings

2.1 Applicable Documents

No.	Document Name	Document Number	Iss./Rev.
AD1	SPIRE FPU Handling and Mechanical Integration Procedure	SPIRE-RAL-PRC-002802	2
AD2	Making SPIRE ESD Safe	SPIRE-RAL-NOT-002028	2
AD3	ESD Regeln für HERSCHEL PLM und Integrations-Aktivitäten	HP-2-ASED-PR-0062	1
AD3	PA Plan	HP-2-ASED-PL-0007	2.1

Table 1: Applicable Documents

2.2 Reference Documents

No.	Document Name	Document Number	Iss./Rev.
RD1	PFM FINAL SIH ELECTRICAL INTEGRATION/CHECKOUT PROCEDURE	SPIRE-RAL-PRC-2951	2.1
RD2	SPIRE FM SHORT FUNCTIONAL TEST PROCEDURE	SPIRE-RAL-PRC-2494	2.4
RD3	PFM CVV INTERNAL SPIRE-SIH ELECTRICAL INTEGRATION PROCEDURE	HP-2-ASED-TP-0150	1.0
RD4	PFM CVV EXTERNAL CHH AND SIH RE-MATING	HP-2-ASED-TP-0158	1.0

Table 2: Reference Documents

2.3 Other Documents

None

3 Personnel

The attendance of the following personnel is requested for the SPIRE PFM final electrical integration:

- SPIRE Engineer
- ASED Engineer
- ASED PA

4 Mating of SIH-IS to CVV-CB and SVM-CB

4.1 Prerequisites

1. The DCU, FCU and DPU have been mechanically and electrically integrated to the SVM panel and the SIH-SS harnesses are all integrated but not mated to the SVM-CB.
2. If the LPU is not integrated to the FCU, **make sure that the dummy LPU simulator plugs are mated to FCU P43/P44** once the harness modifications on the SPIRE panel has been made.
3. The SIH-CS harnesses have been mated to the SPIRE FPU + JFP/JFS
4. The SPIRE SVM panel has been closed
5. The PLM has been mechanically integrated to the SVM
6. The SIH-IS-XX harnesses (XX = 1….13) are mechanically integrated onto the outside of the cryostat.
   a. They are mated at the CVV internal FTHR connectors
   b. They are temporary mechanically integrated to the SVM-CB without electrical termination
7. The SPIRE UFT has been successfully completed.
8. The Ground strap (red tag) from the FPU shall be removed.

LPU not integrated

4.2 End State

The electrical integration tests have been completed
The instrument is ready for SFT

4.3 Notes

1. SPIRE is ESD sensitive. Handling of these units is to be carried out by personnel suitably trained and equipped. Prior to carrying out the mating operations detailed below, the Pxx and Jxx connectors are to put in an ionized air stream continuously to discharge the harness.

2. If an anomaly is detected during the integration test, then the instrument can be switched off from any state using the procedure in §11.32 – SPIRE-SAFE-SWITCH-OFF.

5 Conditions

5.1 Personnel

The treatment process will be conducted by the following personnel:

Personnel	*Date*	*Name*
AIT Manager	14.09.07	R. Hohn
AIT Engineer	14.09.07	A. Koppe
Harness Engineer	14.09.07	J. Lang
SPIRE Representative	14.09.07	D. Grothe
Product Assurance	14.09.07	L. Langenstein

The performers are requested to follow the procedure step-by step and mark the execution of each test step in the allocated column. Results shall be plotted and marked by the concerned test step and figure number. Any deviations which may be necessary shall be described on the assigned pages in chapter 10.1 with a reference at the concerned position in the text where the deviation occurred.

All mating shall be recorded in the test procedure ref. HP-2-ASED-TP-0158 (RD4) too!

5.2 Environmental

There are no specific environmental conditions for treatment process other than in the step by step procedure

5.3 General Precautions and Safety

All safety precautions concerning the personnel and the hardware and must be observed during the whole test.

All operations have to be in accordance to the ESD rules as per AD2 and AD3.

The test responsible confirms with his signature in chapter 5.1 above that all participants are aware of these precautions.

5.4 Special Equipment

Qty.	Equipment	Supplier
1	BoB, 128 way	ASED
1	Resistor, 1 MOhm (5%)	SPIRE
As required	Resistors, 47 Ohm (5%)	SPIRE

5.5 Test Configuration

The following test configuration on the HERSCHEL EGSE shall be selected:

CDMU:

- The Bus IF selected on the HCDMU should be for SPIRE PRIME Instrument, (i.e., 27 TM slots allocated for SPIRE telemetry). For the PRIME side tests the BUS Configuration should be SPIRE Prime (i.e. RT=21) and for the REDUNDANT side test the BUS Configuration should be SPIRE Redundant (i.e. RT=22)
- The HCDMU and CCS should be interconnected.

CCS & IEGSE:

- The CCS and the IEGSE should be interconnected via the Pipe GW.
- The SPIRE MIB should be imported on the CCS.
- The CCS Handler application software should be running on the IEGSE.
- IEGSE system is up and running.(Database, SCOS , QLA, EGSE Router and Gateway, TM ingestion)

6 Verification Requirements and Test Criteria

As per step-by-step procedure

7 Step by Step Procedure

Step-No.	Integration-Step-Description	Results/Remarks	Sign Off
	Mating of SIH-IS to SIH-CS		
1	Prepare a 128-way BOB to short all contacts to spacecraft chassis via a 1MOhm resistor	Alternatively a IDAS shorting plug with 1 MOhm to GND can be used	✓
2	SIH-04 Short contacts of 312100 J03 to spacecraft chassis with BOB		✓
3	Remove Type-VII safeing plug from 211121 J22		✓
4	Mate 211121 P22 to J22		✓
5	Demate BOB from 312110 J03		✓
6	Mate Type-VII safeing plug to 312100 J03		✓
7	SIH-05 Short contacts of 312100 J02 to spacecraft chassis with BOB		✓
8	Remove Type-VII safeing plug from 211121 J23		✓
9	Mate 211121 P23 to J23		✓
10	Demate BOB from 312100 J02		✓
11	Mate Type-VII safeing plug to 312100 J02		✓
12	SIH-06 Short contacts of 312200 J03 to spacecraft chassis with BOB		✓
13	Remove Type-VII safeing plug from 211121 J24		✓
14	Mate 211121 P24 to J24		✓
15	Demate BOB from 312200 J03		✓
16	Mate Type-VII safeing plug to 312200 J03		✓
17	SIH-07 Short contacts of 312200 J04 to spacecraft chassis with BOB		✓
18	Remove Type-VII safeing plug from 211121 J25		✓
19	Mate 211121 P25 to J25		✓

20	Demate BOB from 312200 J04		✓
21	Mate Type-VII safeing plug to 312200 J04		✓
22	SIH-08 Short contacts of 312200 J01 to spacecraft chassis with BOB		✓
23	Remove Type-VII safeing plug from 211121 J27		✓
24	Mate 211121 P27 to J27		✓
25	Demate BOB from 312200 J01		✓
26	Mate Type-VII safeing plug to 312200 J01		✓
27	SIH-09 Short contacts of 312200 J02 to spacecraft chassis with BOB		✓
28	Remove Type-VII safeing plug from 211121 J28		✓
29	Mate 211121 P28 to J28		✓
30	Demate BOB from 312200 J02		✓
31	Mate Type-VII safeing plug to 312200 J02		✓
32	SIH-10 Short contacts of 312300 J06 to spacecraft chassis with BOB		✓
33	Remove Type-VII safeing plug from 211121 J34		✓
34	Mate 211121 P34 to J34		✓
35	Demate BOB from 312300 J06		✓
36	Mate Type-VII safeing plug to 312300 J06		✓
37	SIH-12 Short contacts of 312300 J05 to spacecraft chassis with BOB		✓
38	Remove Type-VII safeing plug from 211121 J33		✓
39	Mate 211121 P33 to J33		✓
40	Demate BOB from 312300 J05		✓
41	Mate Type-VII safeing plug to 312300 J05		✓
42	SIH-02 Short contacts of 312200 J05 to spacecraft chassis with BOB		✓
43	Remove Type-VII safeing plug from 211121 J31		✓

44	Mate 211121 P31 to J31		✓
45	Demate BOB from 312200 J05		✓
46	Mate Type-VII safeing plug to 312200 J05		✓
47	SIH-11 Short contacts of 312300 J04 to spacecraft chassis with BOB		✓
48	Remove Type-VIII safeing plug from 211121 J30		✓
49	Mate 211121 P30 to J30		✓
50	Demate BOB from 312300 J04		✓
51	Mate Type-VIII safeing plug to 312300 J04		✓
52	SIH-13 Short contacts of 312300 J03 to spacecraft chassis with BOB		✓
53	Remove Type-VIII safeing plug from 211121 J29		✓
54	Mate 211121 P29 to J29		✓
55	Demate BOB from 312300 J03		✓
56	Mate Type-VIII safeing plug to 312300 J03		✓
57	SIH-01 Short contacts of 312200 J06 to spacecraft chassis with BOB		✓
58	Remove Type-VI safeing plug from 211121 J32		✓
59	Mate 211121 P32 to J32		✓
60	Demate BOB from 312200 J06		✓
61	Mate Type-VI safeing plug to 312200 J06		✓
62	SIH-03 Short contacts of 312100 J04 to spacecraft chassis with BOB		✓
63	Remove Type-V safeing plug from 211121 J26		✓
64	Mate 211121 P26 to J26		✓
65	Demate BOB from 312100 J04		✓
66	Mate Type-V safeing plug to 312100 J04		✓
	Idd/Iss measurement Preparation		

<table>
<tr>
<td>67</td>
<td>Prepare a 128-way BOB for inline insertion in CB312200 P06/J06 with 47Ω(5%) inline series resistors in the following contacts:

<table>
<tr><th>Function</th><th>Contact number</th></tr>
<tr><td>PTC JFETV Bias_A +ve</td><td>24</td></tr>
<tr><td>PTC JFETV Bias_A -ve</td><td>35</td></tr>
<tr><td>SLW_JFETV_A1 +ve</td><td>92</td></tr>
<tr><td>SLW_JFETV_A1 -ve</td><td>91</td></tr>
<tr><td>SLW_JFETV_A2 +ve</td><td>103</td></tr>
<tr><td>SLW_JFETV_A2 -ve</td><td>113</td></tr>
<tr><td>SSW_JFETV1_A +ve</td><td>68</td></tr>
<tr><td>SSW_JFETV1_A -ve</td><td>57</td></tr>
<tr><td>SSW_JFETV2_A +ve</td><td>70</td></tr>
<tr><td>SSW_JFETV2_A -ve</td><td>81</td></tr>
</table>

The remaining contacts have inline “bridges”
Temporarily label BOB as SPIRE Spect Test</td>
<td></td>
<td>✓</td>
</tr>
</table>

68	Measure and record the resistance of the inline resistors in the BOB prepared for CB312200 P06/J06. The measured resistance is to be 47±2.3 Ω		✓

Function	Resistance (Ohm)
24	47.0
35	46.9
92	46.9
91	46.9
103	46.8
113	46.8
68	46.9
57	46.8
70	47
81	47.1

69	Prepare a 128-way BOB for inline insertion in CB312100 P04/J04 with 47Ω(5%) inline series resistors in the following contacts: **Function** / **Contact number** PSW_JFETV1_A + 26 PSW_JFETV1_A - 37 PSW_JFETV2_A + 38 PSW_JFETV2_A - 49 PSW_JFETV3_A + 48 PSW_JFETV3_A - 60 PSW_JFETV4_A + 59 PSW_JFETV4_A - 71 PSW_JFETV5_A + 50 PSW_JFETV5_A - 61 PSW_JFETV6_A + 62 PSW_JFETV6_A - 51 PMW_JFETV1_A + 86 PMW_JFETV1_A - 87 PMW_JFETV2_A + 97 PMW_JFETV2_A - 98 PMW_JFETV3_A + 108 PMW_JFETV3_A - 109 PMW_JFETV4_A + 116 PMW_JFETV4_A - 117 PLW_JFETV1_A + 99 PLW_JFETV1_A - 100 PLW_JFETV2_A + 110 PLW_JFETV2_A - 111 The remaining contacts have inline "bridges" Temporarily label BOB as SPIRE Pilot Test		✓

70	Measure and record the resistance of the inline resistors in the BOB prepared for CB312200 P06/J06. The measured resistance is to be 47±2.3 Ω	

Contact number	Resistance
26	47
37	46.8
38	47
49	47
48	47.1
60	46.9
59	46.9
71	46.9
50	47
61	46.9
62	46.9
51	46.9
86	46.9
87	46.9
97	46.8
98	46.9
108	47
109	47
116	46.9
117	4.9
99	46.8
100	46.9
110	46.9
111	46.9

	Grounding Check		
71	Remove SPIRE Safeing Plug Type-V from SVM-CB 312100 J04		✓
72	Remove SPIRE Safeing Plug Type-VI from SVM-CB 312200 J06.		✓
73	Remove SPIRE Safeing Plug Type-VIII from SVM-CB 312300 J04.		✓
74	Remove SPIRE Safeing Plug Type-VIII from SVM-CB 312300 J03.		✓
75	Prepare a 128-way BOB and short contacts to remove charge		✓
76	Mate BOB to 312200 J06		✓
77	Verify FPU Isolation from OBA by measuring Pin 5 to Chassis: s.b. > 1 MOhm	open circuit	✓
78	Verify Analogue Ground Isolation from OBA by measuring Pin 93 to Chassis: s.b. > 1 MOhm	open circuit	✓
79	Demate BOB from 312200 J06		✓
80	Mate BOB to 312100 J04		✓
81	Verify FPU Isolation from OBA by measuring Pin 2 to Chassis: s.b. > 1 MOhm	50.2 MΩ	✓
82	Verify Analogue Ground Isolation from OBA by measuring Pin 36 to Chassis: s.b. > 1 MOhm	open circuit	✓
83	Demate BOB from 312100 J04		✓
84	Mate SPIRE Safeing Plug Type-V to SVM-CB 312100 J04		✓
85	Mate SPIRE Safeing Plug Type-VI to SVM-CB 312200 J06.		✓
86	Mate SPIRE Safeing Plug Type-VIII to SVM-CB 312300 J04.		✓
87	Mate SPIRE Safeing Plug Type-VIII to SVM-CB 312300 J03.		✓
	Subsystem harness mating		
88	Verify that CB 312300 J01 is mated with CB 312300 P01		✓
89	Verify that CB 312300 J02 is mated with CB 312300 P02		✓
90	Remove and store protective cover from CB 312300 P06		✓

91	Remove and store SPIRE Safeing Plug Type-VII from CB 312300 J06		✓
92	Mate CB 312300 P06 to 312300 J06		✓
93	Remove and store protective cover from CB 312300 P05		✓
94	Remove and store SPIRE Safeing Plug Type-VII from CB 312300 J05		✓
95	Mate CB 312300 P05 to 312300 J05		✓
96	Remove and store protective cover from CB 312300 P04		✓
97	Remove and store SPIRE Safeing Plug Type-VIII from CB 312300 J04		✓
98	Mate CB 312300 P04 to 312300 J04		✓
99	Remove and store protective cover from CB 312300 P03		✓
100	Remove and store SPIRE Safeing Plug Type-VIII from CB 312300 J03		✓
101	Mate CB 312300 P03 to 312300 J03		✓
	Spectrometer Initial Mating		
102	Short the contacts of the BOB for 312200 J06/P06 to chassis to remove any charge		✓
103	Remove and store the protective cover from 312200 P06		✓
104	Mate the BOB prepared for 312200 J06/P06 to 312200 P06		✓
105	Demate and store the SPIRE Safeing Plug Type-VI from SVM-CB 312200 J06		✓
106	Mate the inline BOB prepared for 312200 J06/P06 to 312200 J06		✓
107	Remove and store the protective cover from 312200 P05		✓
108	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312200 J05		✓
109	Mate 312200 P05 to 312200 J05		✓
110	Mate 312100 P01A to J01A		✓
	Photometer Initial Mating		

	SIH-03		
111	Short the contacts of the BOB for 312100 J04/P04 to chassis to remove any charge		✓
112	Remove and store the protective cover from 312100 P04		✓
113	Mate the BOB prepared for 312100 J04/P04 to 312200 P04		✓
114	Demate the SPIRE Safeing Plug Type-V from SVM-CB 3122100 J04		✓
115	Mate the inline BOB prepared for 312100 J04/P04 to 312100 J04		✓
	SIH-04		✓
116	Remove and store the protective cover from 312100 P03		✓
117	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312100 J03		✓
118	Mate 312100 P03 to 312100 J03		✓
119	Mate 312100 P01B to J01B		✓
	SIH-05		✓
120	Remove and store the protective cover from 312100 P02		✓
121	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312100 J02		✓
122	Mate 312100 P02 to 312100 J02		✓
	SIH-06		✓
123	Remove and store the protective cover from 312200 P03		✓
124	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312200 J03		✓
125	Mate 312200 P03 to 312200 J03		✓
	SIH-07		✓
126	Remove and store the protective cover from 312200 P04		✓
127	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312200 J04		✓

128	Mate 312200 P04 to 312200 J04		✓
	SIH-08		✓
129	Remove and store the protective cover from 312200 P01		✓
130	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312200 J01		✓
131	Mate 312200 P01 to 312200 J01		✓
	SIH-09		✓
132	Remove and store the protective cover from 312200 P02		✓
133	Demate the SPIRE Safeing Plug Type-VII from SVM-CB 312200 J02		✓
134	Mate 312200 P02 to 312200 J02		✓
	Instrument switch-on (Phot. JFETs)		✓
135	Execute Procedure: ~~SPIRE-EM-SFT-DPU-QMR~~ SPIRE Power On (Section 11) also covers Step 13b	Nominal HK packets: ✓ Critical HK packets: ✓ THSK refresh: ✓ TM2N refresh: ✓ TM1N refresh: ✓ SPIRE/CCS time sync: SCOS/THSK/QLA sync:	5 PACKETS NOT RECEIVED FROM BOOT SOFTWARE ✓

20 at 0.45A

136	Execute Procedure: SPIRE-FM-SFT-DRCU-ON-P	THSK stop: TM2N stop: THSK start: TM2N start: SCUP5V (~ 5.2 ± 0.5V): SCUP9V (~ 9.0 ± 0.2V): SCUM9V (~ -9.0 ± 0.2V): BIASP5V (~ 5.1 ± 0.5V): BIASP9V (~ 9.0 ± 0.2V): BIASM9V (~ -9.0 ± 0.2V):	✓
137	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-01-P	SCUFRAMECNT: 31 TM5N: 1 →	✓
138	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-03-P	SCUTEMPSTAT: FREE PUMPHTRTEMP: 54 PUMPHSTEMP: 37 EVAPHSTEMP: 36.9 SHUNTTEMP: 18.7 EMCFILTEMP: 286 SL0TEMP: 19.2 PL0TEMP: 20.3 OPTTEMP: 154.1 BAFTEMP: 191.3 BSMIFTEMP: 98.9 SCAL2TEMP: 161.1 SCAL4TEMP: 156.5 SCALTEMP: 93.3 SMECIFTEMP: 158.0 SMECTEMP: 24.5 BSMTEMP: 12.8	Tell Sunil to put TM5N on SFT parameter list ✓

139	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-06-P	SUBKSTAT: 1 SUBKTEMP: 288	✓
140	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-07-P	SPHSV: 3245 mV EVHSV: 3247 mV SPHTRV: 3.85 V	✓
141	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-04-P	PCALV: PCALCURR: inc 11.8	✓
142	Execute Procedure: SPIRE-FM-SFT-FUNC-SCU-05-P	SCAL4CURR: see 149 SCAL4V: Executed SCAL2CURR: MCU BK SCAL2V: made.	✓
143	Execute Procedure: SPIRE-FM-SFT-FUNC-MCU-01-P	MCUBITSTAT: 1 MCUP5V: 5.01 MCUP14V: 14.14 MCUM14V: -14.97 MCUP15V: 15.55 MCUM15V: -15.62 MCUMACTEMP: 291 MCUSMECTEMP: 296 MCUBSMTEMP: 296	✓
144	Execute Procedure: SPIRE-FM-SFT-FUNC-MCU-02-P	MCUFRAMECNT: 212	✓
145	Execute Procedure: SPIRE-FM-SFT-FUNC-BSM-01-P	CHOPSENSPWR: 1 JIGGSENSPWR: 1	✓
146	Execute Procedure: SPIRE-FM-SFT-BSM-OFF-P	CHOPSENSPWR: 0 JIGGSENSPWR: 0	✓
147	Execute Procedure: SPIRE-FM-SFT-FUNC-SMEC-01-P	SMECENCPWR: 1 SMECLVDTPWR: 1	✓
148	Execute Procedure: SPIRE-FM-SFT-SMEC-OFF-P	SMECENCPWR: SMECLVDTPWR:	✓

MCU FM SFT parameter list see sheet.

149	Execute Procedure: SPIRE-FM-SFT-FUNC-DCU-01-P	DCUFRAMECNT:	✓
150	Execute Procedure: SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P	PLIABITSTAT: PLIAP5V: PLIAP9V: PLIAM9V: LIAP1TEMP to LIAP9TEMP:	✓
151	Execute Procedure: SPIRE-FM-SFT-PHOT-JFET-ON-01	PSWJFETSTAT: PMLWJFETSTAT: PSWJFET1V: PSWJFET2V: PSWJFET3V: PSWJFET4V: PSWJFET5V: PSWJFET6V: PMWJFET1V: PMWJFET2V: PMWJFET3V: PMWJFET4V: PLWJFET1V: PLWJFET2V: TCJFETV:	✓
	Photometer and PTC Idd/Iss		

152	Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312100 P04/J04. The expected values should lie between 55 and 100mV (PLW, PSW and PMW)	

Contact number	Voltage drop
26	62 mV
37	60 mV
38	60 mV
49	56 mV
48	72 mV
60	74 mV
59	62 mV
71	58 mV
50	60 mV
61	57 mV
62	55 mV
51	51 mV
86	69 mV
87	66 mV
97	59 mV
98	55 mV
108	65 mV
109	62 mV
116	56 mV
117	53 mV
99	52 mV
100	54 mV
110	75 mV
111	72 mV

[V]

36	2.49
	-1.495
	2.49
	-1.496
	2.487
	-1.491
	2.49
	-1.495
	2.49
	-1.495
	2.491
	-1.496
	2.488
	-1.493
	2.49
	-1.496
	2.49
	-1.494
	2.491
	-1.496
	2.491
	-1.496
	2.487
	-1.492

153	Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312200 P06/J06. The expected values should lie between 55 and 100mV (PTC)		✓

Contact number	Voltage drop
24	12 mV
35	10 mV

154	Measure the voltage drop along the cryoharness for the PMW/PSW/PLW arrays using the contacts form the BOB prepared for CB312100 P04/J04	Contact A	Contact B	Voltage Drop	✓
		26	42	48 mV	
		37	54	37 47 mV	
		38	53	38 mV	
		49	52	35 mV	
		48	41	48 mV	
		60	30	45 mV	
		59	10	39 mV	
		71	11	36 mV	
		50	19	38 mV	
		61	29	36 mV	
		62	16	36 mV	
		51	27	32 mV	
		86	7	44 mV	
		87	14	42 mV	
		97	24	38 mV	
		98	35	35 mV	
		108	23	41 mV	
		109	34	38 mV	
		116	33	32 mV	
		117	45	34 mV	
		99	70	32 mV	
		100	81	34 mV	
		110	69	48 mV	
		111	80	44 mV	
155	Measure the voltage drop along the cryoharness for the PTC arrays using the contacts form the BOB prepared for CB312200 P06/J06	Contact A	Contact B	Voltage Drop	✓
		24	3	50 mV	
		35	2	49 mV	

156	Execute SPIRE-FM-SPT-PHOT-JFET-ON-2	PSWJFETSTAT: PMLWJFETSTAT: PSWJFET1V: PSWJFET2V: PSWJFET3V: PSWJFET4V: PSWJFET5V: PSWJFET6V: PMWJFET1V: PMWJFET2V: PMWJFET3V: PMWJFET4V: PLWJFET1V: PLWJFET2V: TCJFETV:	Skipped

157	Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312100 P04/J04. The expected values should lie between 55 and 100mV (PLW, PSW and PMW)	

Contact number	Voltage drop
26	
37	
38	
49	
48	
60	
59	
71	
50	
61	
62	
51	
86	
87	
97	
98	
108	
109	
116	
117	
99	
100	
110	
111	

shipped

158	Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312200 P06/J06. The expected values should lie between 55 and 100mV (PTC)		skipped

Contact number	Voltage drop
24	
35	

159	Measure the voltage drop along the cryoharness for the PMW/PSW/PLW arrays using the contacts form the BOB prepared for CB312100 P04/J04	Contact A	Contact B	Voltage Drop	shipped
		26	42		
		37	54		
		38	53		
		49	52		
		48	41		
		60	30		
		59	10		
		71	11		
		50	19		
		61	29		
		62	16		
		51	27		
		86	7		
		87	14		
		97	24		
		98	35		
		108	23		
		109	34		
		116	33		
		117	45		
		99	70		
		100	61		
		110	69		
		111	80		
160	Measure the voltage drop along the cryoharness for the PTC arrays using the contacts form the BOB prepared for CB312200 P06/J06	Contact A	Contact B	Voltage Drop	shipped
		24	3		
		35	2		

161	Execute Procedure: SPIRE-FM-SFT-PHOT-JFET-OFF	PSWJFETSTAT: PMLWJFETSTAT: PSWJFET1V: PSWJFET2V: PSWJFET3V: PSWJFET4V: PSWJFET5V: PSWJFET6V: PMWJFET1V: PMWJFET2V: PMWJFET3V: PMWJFET4V: PLWJFET1V: PLWJFET2V: TCJFETV:	✓
162	Execute Procedure: SPIRE-FM-SFT-PLIA-OFF-P	PLIABITSTAT: PLIAP5V: PLIAP9V: PLIAM9V: LIAP1TEMP to LIAP9TEMP:	✓
163	Execute Procedure: SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P	SLIABITSTAT: SLIAP5V: SLIAP9V: SLIAM9V: LIAS1TEMP to LIAS3TEMP:	✓
	Measure Spect. Idd/Iss		

164	Execute Procedure: SPIRE-FM-SFT-SPEC-JFET-ON-01	SPECJFETSTAT: SSWJFET1V: SSWJFET2V: SLWJFET1V:	✓
165	Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312200 P06/J06. The expected values should lie between 25 and 50mV for contacts 91, 92, 103 and 113 and between 55 and 100mV for contacts 57, 68, 70 and 81		93 ✓
166	Measure the voltage drop with a DVM between the contacts indicated on the BOB prepared for CB312200 P06/J06.		✓

Function	Voltage drop	
92	38 mV	2.446 V
91	37 mV	-1.458 V
103	38 mV	2.446 V
113	37 mV	-1.454 V
68	72 mV	2.413 V
57	69 mV	-1.422 V
70	62 mV	2.426 V
81	58 mV	-1.435 V

Contact A	Contact B	Voltage Drop
92	31	22 mV
91	43	25 mV
103	42	27 mV
113	64	25 mV
68	19	51 mV
57	29	49 mV
70	53	45 mV
81	52	60 mV

<table>
<tr><td>167</td><td>Execute Procedure: SPIRE-FM-SFT-SPEC-JFET-ON-02</td><td>SPECJFETSTAT:
SSWJFET1V:
SSWJFET2V:
SLWJFET1V:</td><td>skipped</td></tr>
<tr><td>168</td><td>Measure the voltage drop with a DVM across the inline resistors in the BOB prepared for CB312200 P06/J06. The expected values should lie between 25 and 50mV for contacts 91, 92, 103 and 113 and between 55 and 100mV for contacts 57, 68, 70 and 81</td><td><table><tr><th>Function</th><th>Voltage drop</th></tr><tr><td>92</td><td></td></tr><tr><td>91</td><td></td></tr><tr><td>103</td><td></td></tr><tr><td>113</td><td></td></tr><tr><td>68</td><td></td></tr><tr><td>57</td><td></td></tr><tr><td>70</td><td></td></tr><tr><td>81</td><td></td></tr></table></td><td>skipped</td></tr>
<tr><td>169</td><td>Measure the voltage drop with a DVM between the contacts indicated on the BOB prepared for CB312200 P06/J06.</td><td><table><tr><th>Contact A</th><th>Contact B</th><th>Voltage Drop</th></tr><tr><td>92</td><td>31</td><td></td></tr><tr><td>91</td><td>43</td><td></td></tr><tr><td>103</td><td>42</td><td></td></tr><tr><td>113</td><td>54</td><td></td></tr><tr><td>68</td><td>19</td><td></td></tr><tr><td>57</td><td>29</td><td></td></tr><tr><td>70</td><td>53</td><td></td></tr><tr><td>81</td><td>52</td><td></td></tr></table></td><td>skipped</td></tr>
</table>

170	Execute Procedure: SPIRE-FM-SFT-SPEC-JFET-OFF	SPECJFETSTAT: SSWJFET1V: SSWJFET2V: SLWJFET1V:	✓
171	Execute Procedure: SPIRE-FM-SFT-SLIA-OFF-P	SLIABITSTAT SLIAP5V SLIAP9V SLIAM9V	✓
172	Execute Procedure SPIRE-FM-SFT-MCU-OFF-P	MCUBITSTAT	✓
173	Execute Procedure SPIRE-FM-SFT-SCU-OFF-P	SCUTEMPSTAT SUBKSTAT	✓
174	Execute SPIRE-FM-SFT-POWER SCU-OFF-P	THSK: TM2N:	✓
175	~~Execute~~		✓
176	Carry out near real time analysis of the data to verify that: 0% < (Idd-Iss) / Idd < 8%		✓
	Final Spectrometer Connection		
177	Demate the 128-way BOB from CB 312200 P06		✓
178	Demate the 128-way BOB from CB 312200 J06		✓
179	Mate CB 312200 J06/P06		✓
180	**Final Photometer Connection**		
181	Demate the 128-way BOB from CB 312100 P04		✓
182	Demate the 128-way BOB from CB 312100 J04		✓
183	Mate CB 312100 J04/P04		✓
184	End of procedure		17:05 L

8 De-mating of SIH-IS and SIH-SS for LPU Integration

8.1 Prerequisites

1. The pre-requisites outlined in chapter 4.1 of this procedure have been completed.

8.2 End State

The SIH is disconnected at the SVM-CB.
The FPU is protected from ESD damage by the safeing plugs on SVM-CB connectors.
The SPIRE SVM panel has been opened.

8.3 Notes

1. SPIRE is ESD sensitive. Handling of these units is to be carried out by personnel suitably trained and equipped. Prior to carrying out the mating operations detailed below, the Pxx and Jxx connectors are to put in an ionized air stream continuously to discharge the harness.

Step-No.	Integration-Step-Description	Results/Remarks	Sign Off
1	**De-mating of SIH-IS and SIH-SS**		
	SIH-SH-03		
	Demate 312100 P04		
	Mate SPIRE Safeing Plug Type-V to SVM-CB 312100 J04		
	Cover 312100 P04 with ESD dust cover		
	SIH-SH-01		
	Demate 312200 P06		
	Mate SPIRE Safeing Plug Type-VI to SVM-CB 312200 J06		

	Cover 312200 P06 with ESD dust cover		
	SIH-SH-11		
	Demate 312300 P04		
	Mate SPIRE Safeing Plug Type-VIII to SVM-CB 312300 J04		
	Cover 312300 P04 with ESD dust cover		
	Demate 312300 P01		
	Cover 312300 P01 with ESD dust cover		
	SIH-SH-13		
	Demate 312300 P03		
	Mate SPIRE Safeing Plug Type-VIII to SVM-CB 312300 J03		
	Cover 312300 P03 with ESD dust cover		
	Demate 312300 P02		
	Cover 312300 P02 with ESD dust cover		
	SIH-SH-02		
	Demate 312200 P05		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312200 J05		
	Cover 312200 P05 with ESD dust cover		
	Demate 312100 P01A		
	Cover 312100 P01A with ESD dust cover		
	SIH-SH-04		

	Demate 312100 P01B		
	Cover 312100 P01B with ESD dust cover		
	Demate 312100 P03		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312100 J03		
	Cover 312100 P03 with ESD dust cover		
	SIH-SH-05		
	Demate 312100 P02		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312100 J02		
	Cover 312100 P02 with ESD dust cover		
	SIH-SH-06		
	Demate 3121200 P03		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312200 J03		
	Cover 312200 P03 with ESD dust cover		
	SIH-SH-07		
	Demate 3121200 P04		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312200 J04		
	Cover 312200 P04 with ESD dust cover		
	SIH-SH-08		
	Demate 3121200 P01		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312200 J01		

	Cover 312200 P01 with ESD dust cover		
	SIH-SH-09		
	Demate 3121200 P02		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312200 J02		
	Cover 312200 P02 with ESD dust cover		
	SIH-SH-10		
	Demate 3121300 P06		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312300 J06		
	Cover 312300 P06 with ESD dust cover		
	SIH-SH-12		
	Demate 3121300 P05		
	Mate SPIRE Safeing Plug Type-VII to SVM-CB 312300 J05		
	Cover 312300 P05 with ESD dust cover		
	End of procedure		

9 Step by Step Procedure for Mating of SIH-IS and SIH-SS after LPU Integration

9.1 Prerequisites

1. The DCU, FCU and DPU have been mechanically and electrically integrated to the SVM panel and the SIH-SS-XX harnesses are all integrated but not mated to the SVM-CB.
2. The SIH-CS harnesses are still mated to the SPIRE FPU + JFP/JFS.
3. The SPIRE SVM panel has been closed.
4. The PLM has been mechanically integrated to the SVM
5. The SIH-IS-XX harnesses (XX= 1…13) are mechanically integrated onto the outside of the cryostat.
   a. They are mated at the CVV internal FTHR connectors.
   b. They are mated at the CVV-CB.
   c. They are mechanically integrated to the SVM-I/F-CB´s with the designated ESD safeing plugs and the UFT has been successfully completed.
6. The LPU Integration has been successfully completed.

9.2 Notes

1. SPIRE is ESD sensitive. Handling of these units is to be carried out by personnel suitably trained and equipped. Prior to carrying out the mating operations detailed below, the Pxx and Jxx connectors are to put in an ionized air stream for > 30 sec to discharge the harness.

No:	Activity	Remarks/Results	Sign off
	Mating of SIH-SS to SIH-IS		
1	***SIH-SS-12***		
2	Remove ESD dust cover from 312300 P05		

No:	Activity	Remarks/Results	Sign off
3	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312300 J05		
4	Mate 312300 J05 to P05		
5	***SIH-SS-10***		
6	Remove ESD dust cover from 3121300 P06		
7	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312300 J06		
8	Mate 312300 J06 to P06		
9	***SIH-SS-11***		
10	Remove ESD dust cover from 312300 P04		
11	Demate SPIRE Safeing Plug Type-VIII from SVM-CB 312300 J04		
12	Mate 312300 P04 to J04		
13	Remove ESD dust cover from 312300 P01		
14	Mate 312300 P01 to J01		

No:	Activity	Remarks/Results	Sign off
15	***SIH-SS-13***		
16	Remove ESD dust cover from 312300 P03		
17	Demate SPIRE Safeing Plug Type-VIII from SVM-CB 312300 J03		
18	Mate 312300 P03 to J03		
19	Remove ESD dust cover from 312300 P02		
20	Mate 312300 P02 to J01		
21	***SIH-SS-04***		
22	Remove ESD dust cover from 312100 P01B		
23	Mate 312100 P01B to J01B		
24	Remove ESD dust cover from 312100 P03		
25	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312100 J03		
26	Mate 312100 P03 to J03		

No:	Activity	Remarks/Results	Sign off
27	***SIH-SS-02***		
28	Remove ESD dust cover from 312200 P05		
29	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312200 J05		
30	Mate 312200 P05 to J05		
31	Remove ESD dust cover from 312100 P01A		
32	Mate 312100 P01A to J01A		
33	***SIH-01***		
34	Remove ESD dust cover from 312200 P06		
35	Demate SPIRE Safeing Plug Type-VI from SVM-CB 312200 J06		
36	Mate 312200 P06 to J06		
37	***SIH-SS-05***		
38	Remove ESD dust cover from 312100 P02		

No:	Activity	Remarks/Results	Sign off
39	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312100 J02		
40	Mate 312100 P02 to J02		
41	***SIH-SS-06***		
42	Remove ESD dust cover from 3121200 P03		
43	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312200 J03		
44	Mate 312200 P03 to J03		
45	***SIH-SS-07***		
46	Remove ESD dust cover from 3121200 P04		
47	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312200 J04		
48	Mate 312200 P04 to J04		
49	***SIH-SS-08***		
50	Remove ESD dust cover from 3121200 P01		

No:	Activity	Remarks/Results	Sign off
51	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312200 J01		
52	Mate 312200 P01 to J01		
53	***SIH-SS-09***		
54	Remove ESD dust cover from 3121200 P02		
55	Demate SPIRE Safeing Plug Type-VII from SVM-CB 312200 J02		
56	Mate 312200 P02 to J02		
57	***SIH-SS-03***		
58	Demate 312100 P04		
59	Mate SPIRE Safeing Plug Type-V to SVM-CB 312100 J04		
60	Mate 312100 P04 to J04		
61	End of procedure		

10 Summary Sheets

10.1 Procedure Variation Summary

Herein are all changes of the procedure are shown.

No.	Para.	Variation Description	Action req.
1	7, step 118	Typo: changed to CB 312100	none
2	7, step 122	Typo: changed to CB 312100	none
3	7, step 135	Replace procedure by SPIRE-POWER-ON which covers also step 136	none
4	7, step 152	Measurements to contact 36 has been added	none
5	7, step 156	Test step skipped	none
6	7, step 157	Test step skipped	none
7	7, step 158	Test step skipped	none
8	7, step 165	Measurements to contact 93 has been added	none
9	7, step 167	Test step skipped	none
10	7, step 168	Test step skipped	none
11	7, step 169	Test step skipped	none
12	7, step 174	Replace procedure by SPIRE-POWER-OFF which covers also step 175	none
13	8,9	chapters not applicable since CPU is not integrated	

Table 10.1-1: Procedure Variation Sheet

10.2 Non Conformance Report (NCR) Summary

NCR - No.	NCR - Title	Date	Open Closed	PA sig.
	none			

Table 10.2-1: Non-Conformance Record Sheet

10.3 Sign-off Sheet

This test has been successfully performed and all open issues are covered by NCR´s or Procedure Variations.

	Date	Signature
Test Manager	12.09.07	
Operator	12.09.07	
PA Responsible	12.09.07	

11 APPENDICES

11.1 Procedure SPIRE Power On

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script S102999SCVT005_ASDSFTSPIR_PWR_ON_P.tcl	—	—	—	

Note: This script powers up the instrument DPU and DRCU prime. Therefore, the next two procedures, 11.2 and 11.3, are not executed manually.

11.2 Procedure SPIRE-FM-SFT-DPU-ON-P

Version	2.3
Date	28 Aug 2007
Purpose	To switch on the SPIRE DPU PRIME and start generating housekeeping
Initial configuration	SPIRE DPU and DRCU PRIME are switched off
Final configuration	SPIRE DPU PRIME is ON and SPIRE HK is being produced , SPIRE DRCU PRIME is OFF
Preconditions	• SPIRE FM DPU is electrically integrated with the Herschel Satellite • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	Nominal and critical HK reports start being generated at their nominal rates of 1Hz and 0.5Hz respectively.

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Select DPU AND OBS PARAMETERS display is on the CCS	—	—	—	
2	**Power ON the SPIRE DPU PRIME unit using the dedicated spacecraft LCL line and configure 1553 Spacecraft bus for SPIRE DPU PRIME (RT = 21)**	—	—	—	
3	Wait for the boot software to produce at least 2 event packets (5,1)				

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
4	Execute TCL script SPIRE-FM-SFT-DPU-START-P-SP.tcl	—	—	—	
5	Check that Nominal and Critical HK packets are arriving at the CCS: **SPIRE Nominal HK:** • (type ,subtype) : (3,25) • APID : 0x502 **SPIRE Critical HK:** • (type ,subtype) : (3,25) • APID: 0x500				
6	Check that THSK parameter is refreshing every second	THSK	Refreshing @ 1 Hz	—	
7	Check that TM2N parameter is incrementing by 1 every second	TM2N	Incrementing by 1 @ 1Hz	—	
8	Check that TM1N parameter is incrementing by 1 every 2 second	TM1N	Incrementing by 1 @ 0.5Hz		
Test Result (Pass/Fail):					

* Assuming that OBT is provided by the HCDMU is TAI, there should be a 33 second difference between OBS and CCS time (assuming CCS is using UTC). In the case the HCDMU is using UTC to specify the on board time, there should be no difference between THSK and the CCS/IEGSE system time.

11.3 Procedure SPIRE-FM-SFT-DRCU-ON-P

Version	2.3
Date	28nd August 2007
Purpose	To switch on the SPIRE DRCU PRIME and start generating housekeeping
Initial configuration	SPIRE DPU PRIME is ON and DRCU PRIME is switched OFF
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced
Preconditions	• SPIRE FM DRCU is electrically integrated with the Herschel Satellite • SPIRE DRCU is switched OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • FUNCTIONAL TEST PARAMETERS display is selected on the CCS
Duration	4 minutes
Pass/Fail Criteria	DRCU voltages show expected 'ON' values

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-DRCU-START-P-STEP1.tcl	—	-----	—	
2	Check that THSK parameter is not refreshing anymore	THSK	Not refreshing	-----	
3	Check that TM2N parameter is not incrementing anymore	TM2N	Not incrementing	-----	
4	**Power ON the SPIRE DRCU PRIME unit using the dedicated spacecraft LCL line.**	—	-----	—	
5	Execute TCL script SPIRE-FM-SFT-DRCU-START-P-STEP2.tcl	—	-----	-----	
6	Check that THSK parameter is again refreshing every second	THSK	Refreshing @ 1Hz		
7	Check that TM2N parameter is again incrementing every second	TM2N	Incrementing by 1 @ 1Hz	—	
8	Check that the SCU/DCU voltages show nominal values	SCUP5V SCUP9V SCUM9V BIASP5V BIASP9V BIASM9V	~ 5.2 ± 0.5V ~ 9.0 ± 0.2V ~ -9.0 ± 0.2V ~ 5.1 ± 0.5V ~ 9.0 ± 0.2V ~ -9.0 ± 0.2V	-----	
Test Result (Pass/Fail):					

11.4 Procedure SPIRE-FM-SFT-FUNC-SCU-01-P

Version	2.3
Date	28nd August 2007
Purpose	SCU science packet generation check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced
Final configuration	Unchanged
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail Criteria	Specified SCU HK parameters show expected increment.

Procedure Steps:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-01-P.tcl	SCUFRAMECNT TM5N	0/31 0x3FFF/1		
Test Result (Pass/Fail):					

11.5 Procedure SPIRE-FM-SFT-FUNC-SCU-03-P

Version	2.3
Date	28rd August 2007
Purpose	SCU DC thermometry check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	8 minutes
Pass/Fail Criteria	DC Thermometry channels show temperature readings according to the actual instrument temperature* *: At warm temperatures all channels should show short circuit RAW readings of -32768

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-03-P.tcl	—	—	—	—
2	**Wait for the parameter BBFULLTYPE to get set to SCU_DC_Therm**				
3	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	0/FFFF/FFFF		
4	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW values of SCU DC thermometry channels.** Record the RAW values of SCU DC thermometry	PUMPHTRTEMP PUMPHSTEMP EVAPHSTEMP SHUNTTEMP EMCFILTEMP SL0TEMP PL0TEMP OPTTEMP BAFTEMP BSMIFTEMP	- - - - - - - - - -		

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
	channels. Nominal values should show a short circuit status (or RAW -32768). **Non Nominal (Open Circuit Criterion): RAW reading in the range [0,-100]**	SCAL2TEMP SCAL4TEMP SCALTEMP SMECIFTEMP SMECTEMP BSMTEMP	- - - - - -		
Test Result (Pass/Fail):					

11.6 Procedure SPIRE-FM-SFT-FUNC-SCU-06-P

Version	2.3
Date	28nd August 2007
Purpose	SCU AC thermometry check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail Criteria	AC Thermometry channel shows temperature readings according to the actual instrument temperature

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-06-P.tcl	—	—	—	—
2	**Wait for the parameter BBFULLTYPE to get set to SCU_AC_Therm**				
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	0/1/1		
4	If the instrument is warm: **Configure the SFT PARAMETERS display to show the RAW values of SCU AC thermometry channel.** Only record the values of SCU AC thermometry channel if it indicates an open circuit. **Open Circuit Criterion: RAW reading in the range [0, -100]**	SUBKTEMP	—		
Test Result (Pass/Fail):					

11.7 Procedure SPIRE-FM-SFT-FUNC-SCU-07-P

Version	2.2
Date	2nd January 2007
Purpose	Sorption Cooler Heater Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail Criteria	Sorption cooler heat switches and pump heater show expected voltages

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-07-P.tcl	—	—	—	—
2	**Wait for the parameter BBFULLTYPE to get set to Cooler_Htr_Chk**	BBFULLTYPE	Cooler_Htr_Chk		
3	Record the value of parameter SPHSV – the Sorption Pump Heat Switch Voltage. *This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.*	SPHSV - mV	0/~323/0		
4	Record the value of parameter EVHSV – the Evaporator Heat Switch Voltage. *This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.*	EVHSV - mV	0/~323/0		
5	Record the value of parameter SPHTRV – the Sorption Pump Heater Voltage. *This voltage stays on for ~20 seconds. Wait for the voltage to go to zero to continue.*	SPHTRV - V	0/~8.8/0		
Test Result (Pass/Fail):					

11.8 Procedure SPIRE-FM-SFT-FUNC-SCU-04-P

Version	2.3
Date	28rd August 2007
Purpose	Photometer Calibration Check (PRIME)
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	Unchanged
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail Criteria	PCAL voltage and current agree with expected values

Procedure Steps:

Step	Description	Parameter Name - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-04-P.tcl **The expected values during the test should be monitored when parameter BBFULLTYPE in the SFT PARAMETERS display is set to PCAL_Check. This usually happens about 30 seconds from the start of test execution.**	PCALCURR - mA PCALV – V BBFULLTYPE	0.0/0.1/0.0 0.0/0.026/0.0 PCAL_Check		
Test Result (Pass/Fail):					

11.9 Procedure SPIRE-FM-SFT-FUNC-SCU-05-P

Version	2.3
Date	28nd August 2007
Purpose	Spectrometer Calibration Check (PRIME)
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	Unchanged
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	SCAL2 and SCAL4 voltage and currents agree with expected values

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SCU-05-P.tcl	—	—	—	
2	**Wait for the parameter BBFULLTYPE to get set to SCAL4_Check**	BBFULLTYPE	SCAL4_Check		
3	A few seconds later record the value of parameters SCAL4CURR and SCAL4V *These parameters are set back to 0 after ~20 seconds*	SCAL4CURR – mA SCAL4V – V	0.0/0.10/0.0 0.0/0.05/0.0		
4	**Wait for the parameter BBFULLTYPE to get set to SCAL2_Check**	BBFULLTYPE	SCAL2_Check		
5	A few seconds later record the values of parameters SCAL2CURR and SCAL2V *These parameters are set back to 0 after ~20 seconds*	SCAL2CURR – mA SCAL2V – V	0.0/0.10/0.0 0.0/0.05/0.0		
Test Result (Pass/Fail):					

11.10 Procedure SPIRE-FM-SFT-FUNC-MCU-01-P

Version	2.3
Date	28th August 2007
Purpose	MCU (PRIME) Boot Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	MCU voltages and board temperatures show expected 'ON' values

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-MCU-01-P.tcl	—	—	—	—
2	Check that the MCU is booted up successfully.	MCUBITSTAT	0/1/1		
3	Check MCU HK parameter values and ensure that the values are refreshing.	MCUP5V MCUP14V MCUM14V MCUP15V MCUM15V MCUMACTEMP MCUSMECTEMP MCUBSMTEMP	~ 5.0 ± 0.2V ~ 14.0 ± 0.5V ~ -14.0 ± 0.5V ~ 15.0 ± 0.5V ~ -15.0 ± 0.7V ~300K ~300K ~300K		
Test Result (Pass/Fail):					

11.11 Procedure: SPIRE-FM-SFT-FUNC-MCU-02-P

Version	2.2
Date	2nd January 2007
Purpose	MCU Nominal Frame Generation Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	Unchanged.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified MCU HK parameters show expected increment

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-MCU-02-P.tcl	MCUFRAMECNT	**FM** : 0/297	—	—
Test Result (Pass/Fail):					

11.12 Procedure SPIRE-FM-SFT-FUNC-BSM-01-P

Version	2.3
Date	28nd August 2007
Purpose	BSM (PRIME) Chop/Jiggle Sensor Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected ON values.

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-BSM-01-P.tcl	----	---	---	----
2	Check that the Chop and Jiggle sensors have switched on	CHOPSENSPWR JIGGSENSPWR	0/1/1 0/1/1		
Test Result (Pass/Fail):					

11.13 Procedure SPIRE-FM-SFT-BSM-OFF-P

Version	2.3
Date	28nd August 2007
Purpose	BSM (PRIME) Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. BSM Chop/Jiggle sensors are OFF.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	HK Parameters CHOPSENSPWR and JIGGSENSPWR show expected OFF values.

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-FM-SFT-BSM-OFF-P.tcl	—	—	—	—
2	Check that the power to the BSM sensors is switched off	CHOPSENSPWR JIGGSENSPWR	1/-/0 1/-/0		
Test Result (Pass/Fail):					

11.14 Procedure SPIRE-FM-SFT-FUNC-SMEC-01-P

Version	2.3
Date	28th August 2007
Purpose	SMEC (PRIME) Encoder/LVDT Sensor Check.
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	HK Parameters SMECENCPWR and SMECLVDTPWR show expected ON values.

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-SMEC-01-P.tcl	----	----	----	----
2	Check that power to the SMEC LED and LVDT sensor is on	SMECENCPWR SMECLVDTPWR	0/-/1 0/1/1		
Test Result (Pass/Fail):					

11.15 Procedure SPIRE-FM-SFT-SMEC-OFF-P

Version	2.3
Date	28th August 2007
Purpose	SMEC (PRIME) Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. SMEC Encoder and LVDT are OFF.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is booted. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	3 minutes
Pass/Fail criteria	HK Parameters SMECENCPWR and SMECLVDTPWR show expected OFF values.

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-FM-SFT-SMEC-OFF-P.tcl	—	—	—	—
2	Check that the power to the SMEC sensors is switched off	SMECENCPWR SMECLVDTPWR	1/-/0 1/-/0		
Test Result (Pass/Fail):					

11.16 Procedure SPIRE-FM-SFT-FUNC-DCU-01-P

Version	2.2
Date	2nd January 2007
Purpose	DCU science packet generation check for all Photometer and Spectrometer packet types (PF, PSW, PMW, PLW, SF, SSW and SLW)
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	Unchanged
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified DCU HK parameter shows expected increment

Procedure Steps:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-01-P tcl	DCUFRAMECNT	0/700		
Test Result (Pass/Fail):					

11.17 Procedure: SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P

Version	2.4
Date	10th September 2007
Purpose	Photometer LIAs PRIME Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Photometer LIAs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • Photometer LIAs are OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS & SFT PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected ON values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-PHOT-P.tcl	PLIABITSTAT	0/1/1		
2	Check Photometer LIA HK parameter values and ensure that the values are refreshing	PLIAP5V PLIAP9V PLIAM9V	0.0/-/ 5.2 ± 0.2V 0.0/-/ 11.5 ± 0.5V 0.0/-/-11.5 ± 0.5V		
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAP1TEMP to LIAP9TEMP	~ 290-300 K		
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail):					

11.18 Procedure: SPIRE-FM-SFT-PHOT-JFET-ON-01

Version	1.1
Date	10th September 2007
Purpose	Photometer JFETs Switch On
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON Photometer JFETs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Photometer JFET HK parameters show expected ON values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PHOT-JFET-ON-01.tcl **Wait for the script to finish executing before proceeding with the next step**	----	----	----	----

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
2	**On the DCU PARAMETERS display check the JFET HK parameters**	PSWJFETSTAT	0x3F		
		PMLWJFETSTAT	0x7F		
		PSWJFET1V	-1.49 ± 0.1 V		
		PSWJFET2V	-1.49 ± 0.1 V		
		PSWJFET3V	-1.49 ± 0.1 V		
		PSWJFET4V	-1.49 ± 0.1 V		
		PSWJFET5V	-1.49 ± 0.1 V		
		PSWJFET6V	-1.49 ± 0.1 V		
		PMWJFET1V	-1.49 ± 0.1 V		
		PMWJFET2V	-1.49 ± 0.1 V		
		PMWJFET3V	-1.49 ± 0.1 V		
		PMWJFET4V	-1.49 ± 0.1 V		
		PLWJFET1V	-1.49 ± 0.1 V		
		PLWJFET2V	-1.49 ± 0.1 V		
		TCJFETV	-1.49 ± 0.1 V		
	Check with Instrument Team before proceeding with the next test.				
Test Result (Pass/Fail):					

11.19 Procedure: SPIRE-FM-SFT-PHOT-JFET-ON-02

Version	1.1
Date	10th September 2007
Purpose	Photometer JFETs Switch On
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON Photometer JFETs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Photometer JFET HK parameters show expected ON values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PHOT-JFET-ON-02.tcl **Wait for the script to finish executing before proceeding with the next step**	----	----	----	----

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
2	**On the DCU PARAMETERS display check the JFET HK parameters**	PSWJFETSTAT PMLWJFETSTAT PSWJFET1V PSWJFET2V PSWJFET3V PSWJFET4V PSWJFET5V PSWJFET6V PMWJFET1V PMWJFET2V PMWJFET3V PMWJFET4V PLWJFET1V PLWJFET2V TCJFETV	0x3F 0x7F -1.68 ± 0.02 V -1.59 ± 0.02 V -1.59 ± 0.02 V -1.68 ± 0.02 V -1.78 ± 0.02 V -1.68 ± 0.02 V -1.68 ± 0.02 V -1.88 ± 0.02 V -1.59 ± 0.02 V -1.88 ± 0.02 V -1.78 ± 0.02 V -1.59 ± 0.02 V -1.49 ± 0.02 V		
	Check with Instrument Team before proceeding with the next test.				
Test Result (Pass/Fail):					

11.20 Procedure: SPIRE-FM-SFT-PHOT-JFET-OFF

Version	1.0
Date	29th August 2007
Purpose	Photometer JFETs Switch Off
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON Photometer JFETs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Photometer LIAs are ON Photometer JFETs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Photometer JFET HK parameters show expected OFF values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PHOT-JFET-OFF.tcl **Wait for the script to finish executing before proceeding with the next step**	----	.....	.....	.....

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
2	On the DCU PARAMETERS display check the JFET HK parameters	PSWJFETSTAT	0		
		PMLWJFETSTAT	0		
		PSWJFET1V	0.0 V		
		PSWJFET2V	0.0 V		
		PSWJFET3V	0.0 V		
		PSWJFET4V	0.0 V		
		PSWJFET5V	0.0 V		
		PSWJFET6V	0.0 V		
		PMWJFET1V	0.0 V		
		PMWJFET2V	0.0 V		
		PMWJFET3V	0.0 V		
		PMWJFET4V	0.0 V		
		PLWJFET1V	0.0 V		
		PLWJFET2V	0.0 V		
		TCJFETV	0.0 V		
	Check with Instrument Team before proceeding with the next test.				
Test Result (Pass/Fail):					

11.21 Procedure: SPIRE-FM-SFT-PLIA-OFF-P

Version	2.4
Date	10th September 2007
Purpose	Photometer LIAs PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Photometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Photometer LIAs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • Photometer LIAs are ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Photometer LIA HK parameters show expected OFF values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-PLIA-OFF-P.tcl	PLIABITSTAT	1/-/0		
2	Check Photometer LIA HK parameter values	PLIAP5V PLIAP9V PLIAM9V	5.2 ± 0.2V/-/0.0 11.5 ± 0.5V/-/0.0 -11.5 ± 0.5V/-/0.0		
Test Result (Pass/Fail):					

11.22 Procedure: SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P

Version	2.4
Date	10th September 2007
Purpose	Spectrometer LIAs PRIME Check
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Spectrometer LIAs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • Spectrometer LIAs are OFF • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS & DCU PARAMETERS displays are selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected ON values

Procedure Steps for FM:

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-FUNC-DCU-04-SPEC-P.tcl	SLIABITSTAT	0/1/1		
2	Check Spectrometer LIA HK parameter values and ensure that the values are refreshing	SLIAP5V SLIAP9V SLIAM9V	0.0/-/ 5.2 ± 0.2V 0.0/-/ 11.5 ± 0.5V 0.0/-/-11.5 ± 0.5V		
3	**On the DCU PARAMETERS display check that the LIA temperatures are slowly warming up.** At switch-on it is possible that some of the LIA temperatures will be in soft or even hard limits. No action is required.	LIAS1TEMP to LIAS3TEMP	~ 290-300 K		
4	**Wait for ~3 minutes before continuing with the SFTs**	—	—	—	—
Test Result (Pass/Fail):					

11.23 Procedure: SPIRE-FM-SFT-SPEC-JFET-ON-01

Version	1.1
Date	10th September 2007
Purpose	Spectrometer JFETs Switch On
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON Spectrometer JFETs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Spectrometer JFET HK parameters show expected ON values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SPEC-JFET-ON-01.tcl **Wait for the script to finish executing before proceeding with the next step**	—	.....	.....	.....
2	On the DCU PARAMETERS display check the JFET HK parameters **Check with Instrument Team before proceeding with the next test.**	SPECJFETSTAT SSWJFET1V SSWJFET2V SLWJFET1V	7 -1.49 ± 0.1 V -1.49 ± 0.1 V -1.49 ± 0.1 V		
Test Result (Pass/Fail):					

11.24 Procedure: SPIRE-FM-SFT-SPEC-JFET-ON-02

Version	1.1
Date	10th September 2007
Purpose	Spectrometer JFETs Switch On
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON Spectrometer JFETs are ON
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Spectrometer JFET HK parameters show expected ON values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SPEC-JFET-ON-02.tcl **Wait for the script to finish executing before proceeding with the next step**	—	—	—	—
2	On the DCU PARAMETERS display check the JFET HK parameters **Check with Instrument Team before proceeding with the next test.**	SPECJFETSTAT SSWJFET1V SSWJFET2V SLWJFET1V	7 -1.68 ± 0.02 V -2.07 ± 0.02 V -1.59 ± 0.02 V		

11.25 Procedure: SPIRE-FM-SFT-SPEC-JFET-OFF

Version	1.0
Date	29th August 2007
Purpose	Spectrometer JFETs Switch Off
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON Spectrometer JFETs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced AC/DC thermometry is ON MCU PRIME is booted Spectrometer LIAs are ON Spectrometer JFETs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • DCU PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Spectrometer JFET HK parameters show expected OFF values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SPEC-JFET-OFF.tcl **Wait for the script to finish executing before proceeding with the next step**	—	—	—	—

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
2	On the DCU PARAMETERS display check the JFET HK parameters **Check with Instrument Team before proceeding with the next test.**	SPECJFETSTAT SSWJFET1V SSWJFET2V SLWJFET1V	0 0.0 V 0.0 V 0.0 V		
Test Result (Pass/Fail):					

11.26 Procedure: SPIRE-FM-SFT-SLIA-OFF-P

Version	2.4
Date	10th September 2007
Purpose	Spectrometer LIAs PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Spectrometer LIAs are ON
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted. Spectrometer LIAs are OFF
Constraints	• SPIRE DRCU PRIME is switched ON • Spectrometer LIAs are ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified Spectrometer LIA HK parameters show expected OFF values

Step	Description	Parameter	Expected Values Before/ After	Actual Values Before /After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SLIA-OFF-P.tcl	SLIABITSTAT	1/-/0		
2	Check Photometer LIA HK parameter values	SLIAP5V SLIAP9V SLIAM9V	5.2 ± 0.2V/-/0.0 11.5 ± 0.5V/-/0.0 -11.5 ± 0.5V/-/0.0		
Test Result (Pass/Fail):					

11.27 Procedure SPIRE-FM-SFT-MCU-OFF-P

Version	2.3
Date	28nd August 2007
Purpose	MCU PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is booted.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON and MCU PRIME is OFF.
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MCU PRIME is ON. • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified MCU HK Parameter shows expected value.

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute SPIRE-FM-SFT-MCU-OFF-P.tcl	—	—	—	—
2	Check that the MCU is switched off	MCUBITSTAT	1/-/0		
Test Result (Pass/Fail):					

11.28 Procedure SPIRE-FM-SFT-SCU-OFF-P

Version	2.3
Date	28nd August 2007
Purpose	SCU PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON.
Final configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is OFF
Constraints	• SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	2 minutes
Pass/Fail criteria	Specified SCU HK Parameters show expected value.

Procedure Steps:

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-SCU-OFF-P.tcl	—	—	—	—
2	A few seconds later record the value of parameter SCUTEMPSTAT	SCUTEMPSTAT	FFFF/-/0		
3	A few seconds later record the value of parameter SUBKSTAT	SUBKSTAT	1/-/0		
Test Result (Pass/Fail):					

11.29 Procedure SPIRE Power OFF

Step	Description	Parameter	Expected Values Before/After	Actual Values Before/After	Pass/ Fail
1	Execute TCL script S102999SCVT007_ASDSFTSPIR_PWR_OFF_P.tcl	—	—	—	

Note: This script powers down the instrument DPU and DRCU prime. Therefore, the next two procedures, 11.30 and 11.31, are not executed manually.

11.30 Procedure: SPIRE-FM-SFT-DRCU-OFF-P

Version	2.2
Date	2nd January 2007
Purpose	DRCU PRIME Switch OFF
Initial configuration	SPIRE DPU and DRCU PRIME are ON and SPIRE HK is being produced and AC/DC thermometry is ON.
Final configuration	SPIRE DPU PRIME is ON, SPIRE DRCU PRIME is OFF and SPIRE HK is not being produced .
Constraints	• SPIRE-FM-SFT-SCU-OFF has been executed. • SPIRE DRCU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	THSK and TM2N stop refreshing/incrementing

Step	Description	Parameter - Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Execute TCL script SPIRE-FM-SFT-DRCU-OFF.tcl	—	—	—	
2	Check that THSK parameter is not refreshing anymore	THSK	Not refreshing	—	
3	Check that TM2N parameter is not incrementing anymore	TM2N	Not incrementing	—	
4	**Power OFF the SPIRE DRCU PRIME unit.**	—	—	—	
Test Result (Pass/Fail):					

11.31 Procedure: SPIRE-FM-SFT-DPU-OFF-P

Version	2.2
Date	2nd January 2007
Purpose	DPU PRIME Switch OFF
Initial configuration	SPIRE DPU PRIME is ON but not generating HK.
Final configuration	SPIRE DPU PRIME is OFF.
Constraints	• SPIRE-FM-SFT-DRCU-OFF has been executed. • SPIRE DPU PRIME is switched ON • SPIRE MIB PRIME is imported in the CCS database. • CCS is up and running • SFT PARAMETERS display is selected on the CCS
Duration	5 minutes
Pass/Fail criteria	Power to SPIRE DPU PRIME is OFF

Procedure Steps:

Step	Description	Parameter – Unit	Expected Values Before/ During/ After	Actual Values Before/ During/ After	Success/ Failure
1	Power OFF the SPIRE DPU PRIME unit.	—	—	—	
Test Result (Pass/Fail):					

11.32 SPIRE-SAFE-SWITCH-OFF

Version	2.3
Date	10th September 2007
Purpose	To switch OFF the SPIRE instrument if an anomaly should occur
Initial configuration	SPIRE can be on ANY configuration as specified on the procedure steps
Final configuration	SPIRE is OFF
Preconditions	• SPIRE FM DPU is electrically integrated with the Herschel Satellite • SPIRE MIB PRIME 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.

Note:
All HK parameters relevant to this procedure can be located on the FUNCTIONAL TEST PARAMETERS CCS display. The exact name of the script to be executed at each step depends on whether the Prime or Redundant instrument is switched on.

Step	Description	Parameter - Unit	Display	Actual value before/ after
1	**Check to see if the Photometer LIAs are on** If PLIABITSTAT=1 then execute SPIRE-FM-SFT-PLIA-OFF-<P/R>.tcl	PLIABITSTAT	**0 or 1**	
2	**Check to see if the Spectrometer LIAs are on** If SLIABITSTAT=1 then execute SPIRE-FM-SFT-SLIA-OFF-<P/R>.tcl	SLIABITSTAT	**0 or 1**	

Step	Description	Parameter - Unit	Display	Actual value before/ after
3	Switch off the Phot and Spec JFETs: Execute SPIRE-FM-SFT-PHOT-JFET-OFF.tcl Execute SPIRE-FM-SFT-SPEC-JFET-OFF.tcl	-	-	-
4	**Check to see if the BSM is on** If CHOPSENSPWR=1 or JIGGSENSPWR=1, then execute SPIRE-FM-SFT-BSM-OFF-<P/R>.tcl	CHOPSENSPWR JIGGSENSPWR	**0 or 1** **0 or 1**	
5	**Check to see if the SMEC is on** If SMECENCPWR=1 or SMECLVDTPWR=1, then execute SPIRE-FM-SFT-SMEC-OFF-<P/R>.tcl	SMECENCPWR SMECLVDTPWR	**0 or 1** **0 or 1**	
6	**Check to see if the MCU is on** If MCUBITSTAT=1 then execute SPIRE-FM-SFT-MCU-OFF-<P/R>.tcl	MCUBITSTAT	**0 or 1**	
7	**Check to see if the SCU DC/AC thermometry is on** If SUBKSTAT=1 or SCUTEMPSTAT≠0, then execute SPIRE-FM-SFT-SCU-OFF-<P/R>.tcl	SUBKSTAT SCUTEMPSTAT	**0 or 1** **≠ 0**	
8	Execute Procedure SPIRE-FM-SFT-DRCU-OFF-<P/R>.tcl	TM2N THSK	**Should stop updating**	
9	Execute Procedure SPIRE-FM-SFT-DPU-OFF-<P/R>.tcl	n/a	**n/a**	

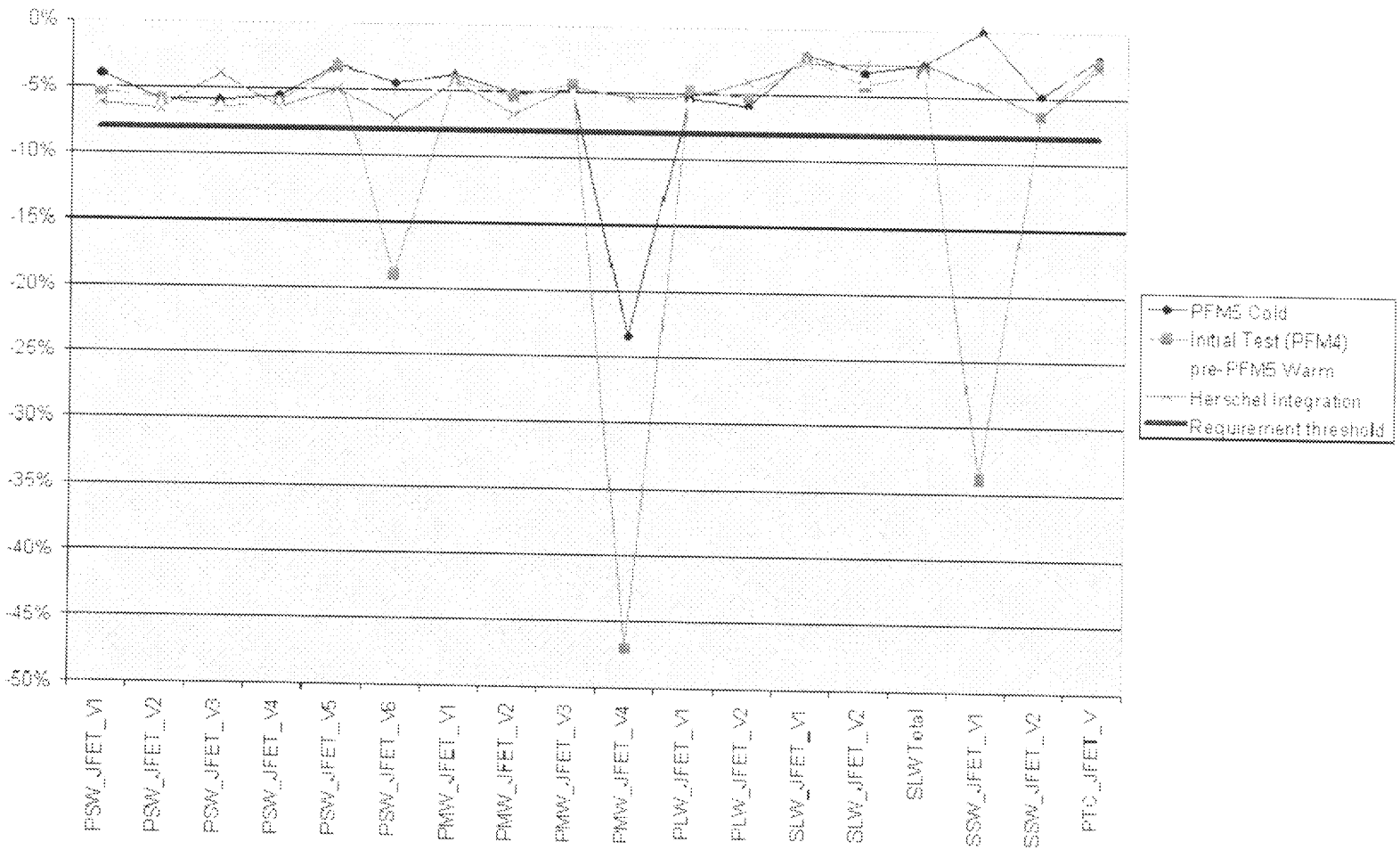
END OF DOCUMENT

	Name	Dep./Comp.
	Alberti von Mathias Dr.	ASG23
	Baldock Richard	FAE12
	Barfage Bernhard	AED13
	Bayer Thomas	ASA42
	Brune Holger	ASA45
	Edelhoff Dirk	AED2
	Fehrnger Alexander	ASG13
	Fricke Wolfgang Dr.	AED 65
	Geiger Hermann	ASA42
	Grasl Andreas	OTN/ASA44
X	Grassholf Brigitte	AET12
X	Hamer Simon	Terma
	Hendrikse Jeffrey	HE Space
X	Hendry David	Terma
	Hengstler Reinhold	ASA42
	Hinger Jürgen	ASG23
	Hohn Rüdiger	AED65
	Hölzle Edgar Dr.	AED32
	Hopfgarten Michael	AED32
	Huber Johann	ASA42
	Hund Walter	ASE252
X	Idler Siegmund	AED312
	Iványi von András	FAE12
	Jahn Gerd Dr.	ASG23
	Kalde Clemens	ASM2
	Kameter Rudolf	OTN/ASA42
	Kettner Bernhard	AET42
	Knoblauch August	AET32
X	Koelle Markus	ASA43
X	Koppe Axel	AED312
	Kroeker Jürgen	AED65
	La Gioia Valentina	Terma
	Lang Jürgen	ASE252
	Langenstein Rolf	AED15
	Langfermann Michael	ASA41
	Martin Olivier	ASA43
	Maukisch Jan	ASA43
	Much Christoph	ASA43
	Müller Jörg	ASA42
	Müller Martin	ASA43
	Peltz Heinz-Willi	ASG13
	Pietroboni Karin	AED65
	Platzer Wilhelm	AED2
	Reichle Konrad	ASA42
	Runge Axel	OTN/ASA44
	Sauer Maximilian Dr.	AED65
	Schunk Dietmar	AED32

	Name	Dep./Comp.
	Schmidt Thomas	AED15
	Schuler Günter	ASA42
	Schweickert Gunn	ASG23
	Sonn Nico	ASG51
	Steininger Eric	AED32
X	Stritter Rene	AED11
	Suess Rudi	OTN/ASA44
	Theunissen Martijn	DSSA
	Vascotto Riccardo	AED11
	Wagner Klaus	ASG23
X	Wietbrock Walter	AET12
	Wöhler Hans	ASG23
	Wössner Ulrich	ASE252
	Zumstein Armin	ASQ42
X	ESA/ESTEC	ESA
X	Thales Alenia Space Cannes	TAS-F
	Thales Alenia Space Torino	TAS-I
	Instruments:	
	MPE (PACS)	MPE
X	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

Annex 2 Test Results (Step 176)

Provisional results according to test step 176, provided by SPIRE:



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	Barlage Bernhard	AED13
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X	Fricke Wolfgang Dr.	AED 65
	Geiger Hermann	ASA42
	Grasl Andreas	OTN/ASA44
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X	Hamer Simon	Terma
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X	Hopfgarten Michael	AED32
	Huber Johann	ASA42
	Hund Walter	ASE252
X	Idler Siegmund	AED312
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	Jahn Gerd Dr.	ASG23
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	Langlermann Michael	ASA41
	Martin Olivier	ASA43
	Maukisch Jan	ASA43
	Much Christoph	ASA43
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X	Müller Martin	ASA43
	Peltz Heinz-Willi	ASG13
	Pietroboni Karin	AED65
	Platzer Wilhelm	AED2
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	Runge Axel	OTN/ASA44
	Sauer Maximilian Dr.	AED65
	Schink Dietmar	AED32
	Schmidt Thomas	AED15

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	Schweickert Gunn	ASG23
	Sonn Nico	ASG51
	Steininger Eric	AED32
X	Stritter Rene	AED11
	Suess Rudi	OTN/ASA44
	Theunissen Martijn	DSSA
	Vascotto Riccardo	HE Space
	Wagner Klaus	ASG23
X	Wielbrock Walter	AET12
	Wöhler Hans	ASG23
	Wössner Ulrich	ASE252
	Zumstein Armin	ASQ42
X	ESA/ESTEC	ESA
X	Thales Alenia Space Cannes	TAS-F
	Thales Alenia Space Torino	TAS-I
	Instruments:	
	MPE (PACS)	MPE
X	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 Ingeniería SA	SEN
	Thales Alenia Space, Antwerp	TAS-ETCA