SPIRE

SUBJECT: SPIRE PFM SIH ELECTRICAL INTEGRATION PROCEDURE

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DOCUMENT No: SPIRE-RAL-PRC-002882

ISSUE: 2.0 **Date: 18.04.2007**

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Change Record

ISSUE	DATE	
1.0	12-04-2007	Initial release -
2.0	18-04-2007	ASED update

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Number	TITLE	Document Number	Issue
RD1	Email: Instruments El. Integration Flow (See §4 Appendix 1 – EADS Integration Sequence Email)	NA	NA
RD2	Cryo Harness Interconnection Diagram SPIRE (PFM)	2547-121430-030-01-0B	B
RD3	Cryo-Harness Interconnection Diagram SPIRE (PFM)	HP-2-ASED-ID-0091-01-0B	B
RD4	PFM CVV int SPIRE SIH Integration	HP-2-ASED-TP-0050	1

2. SCOPE AND INTRODUCTION

This document establishes the detailed procedure to be followed for the electrical integration of the SIH to the SPIRE FPU, JFP and JFS. It also covers the mating of the SIH-CS-01 to -13 harnesses to the CVV-FTHR connectors 211121 J22 to J34. As outlined in RD 1 (see Appendix 1.
The incorporation of the measurement of the balance of Idd and Iss for the JFET modules is a result of the fact that an extra propagating failure mechanism was discovered during the SPIRE PFM-4 ILT campaign. It is a diagnostic test of the integrity of the entire SPIRE detector system in the warm condition. The chronological SIH connector mating and fixation in final flight configuration and its inspections need, have been edit in the step-by-step procedure too. The final CVV internal inspection to be performed by ASED , Alcatel & ESA after the SPIRE cold-unit and SIH electrical integration is covered here in too.

3. MATING OF SIH-CS-01 TO -13 TO FPU, JFP AND JFS

3.1 Prerequisites

1. The FPU, JFP and JFS are mechanically integrated to the OBA as detailed in AD 1, §6.2.1 through §6.2.4
2. The SIH-CS-XX harnesses have been integrated into the cryostat

3.2 Notes:

1. The Isolation Test detailed in AD 1, §6.2.5 (Isolation Test) is to be completed during the first stage of the procedure. The results must be compliant with the specified pass criteria for the integration to continue.
2. The FPU, JFP and JFS are 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.
3. The connector mating operations detailed below are to be recorded in the relevant sections of the paper PFM SPIRE EIDP
4. Red tag items removed from the FPU and JFET modules (safeing plugs and ESD caps to be placed in the SPIRE red tag box and stored in the SPIRE transport container)

3.3 Detailed Step-by-step Procedure

No:	Activity	Remarks/Results	Sign off
	Grounding check		
1	Carry out the activities in AD 1, §6.2.5	**FPU / OBA:** **Spect. Det. Box / OBA:** **Phot. Det. Box / OBA:** **Spect. Det. Box / FPU:** **Phot. Det. Box / FPU:** **Phot. Det. Box / Spect. Det. Box:**	
2	Remove the ESD covers from the JFP 121210 J25 through JFP J28 and remate the Type-III safeing plugs	Identify removed cold-unit connector-covers as RED-TAG Item & store it in subject cubboard	
	Mating of FPU SIH	The connector codes shall be defined, because E-PLM mationg / Demating DB updates	
3	Detailed inspection be performed on FPU J20, J22, J24 & J25 for properly tight srew-lock assies, else fixation bolts to be locally stoppped by use of EC2216	(HP-2-ASED-NC-1340)	
4	Verify that SPIRE Safeing Plug Type-VIII is mated to CVV FTHR 211121 J30. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
5	Verify that SPIRE Safeing Plug Type-VIII is mated to CVV FTHR 211121 J29. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
6	Verify that SPIRE Safeing Plug Type-VII is mated CVV FTHR 211121 J34. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
7	Verify that SPIRE Safeing Plug Type-VII is mated to SVM-CB 312300 J05 CVV FTHR 211121 J33. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
8	Remove and store ESD cover from FPU 121100 J23 Mate FPU SIH 121100 P23 (Prime thermometry) Perform torque of 0,33 Nm	Identify removed cold-unit connector shorting-plugs as RED-TAG Item & store it in subject cubboard	

No:	Activity	Remarks/Results	Sign off
9	Remove and store ESD cover from FPU 121100 J24 Inspect FPU J24 jackpost threads Mate FPU SIH 121100 P24 (Red. thermometry) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm Check SIH connector fixation bolts are fit to end, else lock with EC2216		
10	Remove and store ESD cover from FPU J19 Mate FPU SIH 121100 P19 (Prime cooler) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
11	Remove and store ESD cover from FPU 121100 J20 Inspect FPU J20 jackpost threads Mate FPU SIH 121100 P20 (Red. cooler) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm Check SIH connector fixation bolts are fit to end, else lock with EC2216		
12	Remove and store ESD cover from FPU 121100 J25 Inspect FPU J25 jackpost threads Mate FPU SIH 121100 P25 (Prime BSM) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm Check SIH connector fixation bolts are fit to end, else lock with EC2216		
13	Remove and store ESD cover from FPU 121100 J26 Mate FPU SIH 121100 P26 (Red. BSM) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
14	Remove and store ESD cover from FPU 121100 J21 Mate FPU SIH 121100 P21 (Prime S-Cal) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		

No:	Activity	Remarks/Results	Sign off
15	Remove and store ESD cover from FPU 121100 J22 Inspect FPU J22 jackpost threads Mate FPU SIH 121100 P22 (Red. S-Cal) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm Check SIH connector fixation bolts are fit to end, else lock with EC2216		
16	Remove and store safeing plug from FPU 121100 J29 Mate FPU SIH 121100 P21 (Prime SMEC) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
17	Remove and store safeing plug from FPU 121100 J30 Mate FPU SIH 121100 P30 (Red. SMEC) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
18	Remove and store safeing plug from FPU 121100 J27 Mate FPU SIH 121100 P27 (Prime SMEC) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
19	Remove and store safeing plug from FPU 121100 J28 Mate FPU SIH 121100 P28 (Red. SMEC) Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
	Mating of JFS (Spectrometer) SIH		
20	Verify that SPIRE Safeing Plug Type-VI is mated to CVV FTHR 211121 J32. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
21	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J31. If not installed, then mate	Take Saving-plugs from RED-TAG Item cubboard & record removal	
22	Remove SPIRE Safeing Plug Type-III from JFS 121220 J09		

No:	Activity	Remarks/Results	Sign off
23	Mate JFS SIH 121220 P09 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
24	Remove SPIRE Safeing Plug Type-III from JFS 121220 J10		
25	Mate JFS SIH 121220 P10 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
26	Remove and store ESD cover from JFS 121220 J07 Mate JFS SIH 121220 P07 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
27	Remove and store ESD cover from JFS J05 Mate JFS SIH 121220 P05 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
28	Remove and store ESD cover from JFS 121220 J06 Mate JFS P06 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
29	Remove and store ESD cover from JFS 121220 J02 Mate JFS SIH 121220 P02 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
30	Remove and store ESD cover from JFS 121220 J01 Mate JFS SIH 121220 P01 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		

No:	Activity	Remarks/Results	Sign off
31	Remove and store ESD cover from JFS 121220 J03 Mate JFS SIH 121220 P03 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
32	Remove and store ESD cover from JFS 121220 J04 Mate JFS SIH 121220 P04 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
33	Verify that 312300 J1 and J02 Launch-latches are integrated.	N/A for CVVint Integration	
	Mating of JFP SIH (Photometer)		
34	Verify that SPIRE Safeing Plug Type-V is mated to CVV FTHR 211121 J26. If not installed, then mate		
35	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J22 . If not installed, then mate		
36	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J23 . If not installed, then mate		
37	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J24. If not installed, then mate		
38	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J25. If not installed, then mate		
39	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J27. If not installed, then mate		
40	Verify that SPIRE Safeing Plug Type-VII is mated to CVV FTHR 211121 J28. If not installed, then mate		
41	Verify that 312100 J1A and J1B links are integrated.	N/A for CVVint Integration	
42	Remove and store SPIRE Safeing Plug Type-III from JFP 121210 J25	Store Saving-plugs in RED-TAG Item cubboard	

No:	Activity	Remarks/Results	Sign off
43	Mate JFP SIH 121210 P25 to J25 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
44	Remove and store SPIRE Safeing Plug Type-III from JFP 121210 J27	Store Saving-plugs in RED-TAG Item cubboard	
45	Mate JFP SIH 121210 P27 to J27 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
46	Remove and store SPIRE Safeing Plug Type-III from JFP 121210 J26	Store Saving-plugs in RED-TAG Item cubboard	
47	Mate JFP SIH 121210 P26 to J26 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
48	Remove and store SPIRE Safeing Plug Type-III from JFP 121210 J28	Store Saving-plugs in RED-TAG Item cubboard	
49	Mate JFP SIH 121210 P28 to J28 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
50	Remove and store ESD cover from JFP121210 J16 Mate JFP SIH 121210 P16 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
51	Remove and store ESD cover from JFP 121210 J15 Mate JFP SIH 121210 P15 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
52	Remove and store ESD cover from JFP 121210 J13 Mate JFP SIH 121210 P13 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		

No:	Activity	Remarks/Results	Sign off
53	Remove and store ESD cover from JFP 121210 J14 Mate JFP P14 Perform torque of 0,33 Nm		
54	Remove and store ESD cover from JFP 121210 J18 Mate JFP SIH 121210 P18 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
55	Remove and store ESD cover from JFP 121210 J17 Mate JFP P17 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
56	Remove and store ESD cover from JFP 121210 J21 Mate JFP SIH 121210 P21 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
57	Remove and store ESD cover from JFP 121210 J22 Mate JFP SIH 121210 P22 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
58	Remove and store ESD cover from JFP 121210 J24 Mate JFP SIH 121210 P24 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
59	Remove and store ESD cover from JFP 121210 J23 Mate JFP P23 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		

No:	Activity	Remarks/Results	Sign off
60	Remove and store ESD cover from JFP 121210 J19 Mate JFP SIH 121210 P19 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
61	Remove and store ESD cover from JFP 121210 J20 Mate JFP SIH 121210 P20 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
62	Remove and store ESD cover from JFP 121210 J02 Mate JFP SIH 121210 P02 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
63	Remove and store ESD cover from JFP 121210 J01 Mate JFP SIH 121210 P01 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
64	Remove and store ESD cover from JFP 121210 J05 Mate JFP SIH 121210 P05 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
65	Remove and store ESD cover from JFP 121210 J06 Mate JFP SIH 121210 P06 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
66	Remove and store ESD cover from JFP 121210 J10 Mate JFP SIH 121210 P10 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		

No:	Activity	Remarks/Results	Sign off
67	Remove and store ESD cover from JFP 121210 J09 Mate JFP P09 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
68	Remove and store ESD cover from JFP 121210 J11 Mate JFP SIH 121210 P11 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
69	Remove and store ESD cover from JFP 121210 J12 Mate JFP SIH 121210 P12 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
70	Remove and store ESD cover from JFP 121210 J08 Mate JFP SIH 121210 P08 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
71	Remove and store ESD cover from JFP 121210 J07 Mate JFP SIH 121210 P07 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
72	Remove and store ESD cover from JFP121210 J03 Mate JFP P03 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
73	Remove and store ESD cover from JFP 121210 J04 Mate JFP SIH 121210 P04 Measuere FPU Isolation Resistance to OBA structure [R > 1MΩ] Perform torque of 0,33 Nm		
74	Record mate/demate activities in paper EIDP log	Record in E-PLM Mating / Demating DB too	

No:	Activity	Remarks/Results	Sign off
	Verification of Instrument Grounding		
75	Remove SPIRE Safeing Plug Type-V from CVV FTHR 211121 J26		
76	Remove SPIRE Safeing Plug Type-VI from CVV FTHR 211121 J32		
77	Remove SPIRE Safeing Plug Type-VIII from CVV FTHR 211121 J30		
78	Remove SPIRE Safeing Plug Type-VIII from CVV FTHR 211121 J29		
79	Prepare a 128-way BOB with short contacts & mate Short-plug to remove charge		
80	Mate BOB to CVV FTHR 211121 J32		
81	Demate BOB Short-plug		
82	Verify FPU Isolation from OBA by measuring Pin 5 to Chassis: s.b. > 1 MOhm		
83	Verify Analogue Ground Isolation from OBA by measuring Pin 93 to Chassis: s.b. > 1 MOhm		
84	Demate BOB from CVV FTHR 211121 J32		
85	Prepare a 128-way BOB ~~and~~ with short contacts & mate Short-plug to remove charge		
86	Demate BOB Short-plug		
87	Mate BOB to CVV FTHR 211121 J26 312100 J04		
88	Verify FPU Isolation from OBA by measuring Pin 2 to Chassis: s.b. > 1 MOhm		
89	Verify Analogue Ground Isolation from OBA by measuring Pin 36 to Chassis: s.b. > 1 MOhm		
90	Demate BOB from CVV FTHR 211121 J26		
91	Mate SPIRE Safeing Plug Type-V to CVV FTHR 211121 J26		
92	Mate SPIRE Safeing Plug Type-VI to CVV FTHR 211121 J32		
93	Mate SPIRE Safeing Plug Type-VIII to CVV FTHR 211121 J30		
94	Mate SPIRE Safeing Plug Type-VIII to CVV FTHR 211121 J29 SVM-CB 312300 J03.		
95	Perform final srew-lock fixation " prior flight " PA to perform final FPU & JFET SIH inspection		
96	ASED final inspection of SPIRE Cold-unit & SIH integration		
97	RAL final inspection of SPIRE Cold-unit & SIH integration		

No:	Activity	Remarks/Results	Sign off
98	AAS-F final inspection of SPIRE Cold-unit & SIH integration		
99	ESA final inspection of SPIRE Cold-unit & SIH integration		
100	End of step by step procedure - CVV internal part		

SPIRE FPU SIH I/F-Connectors (RD-3)

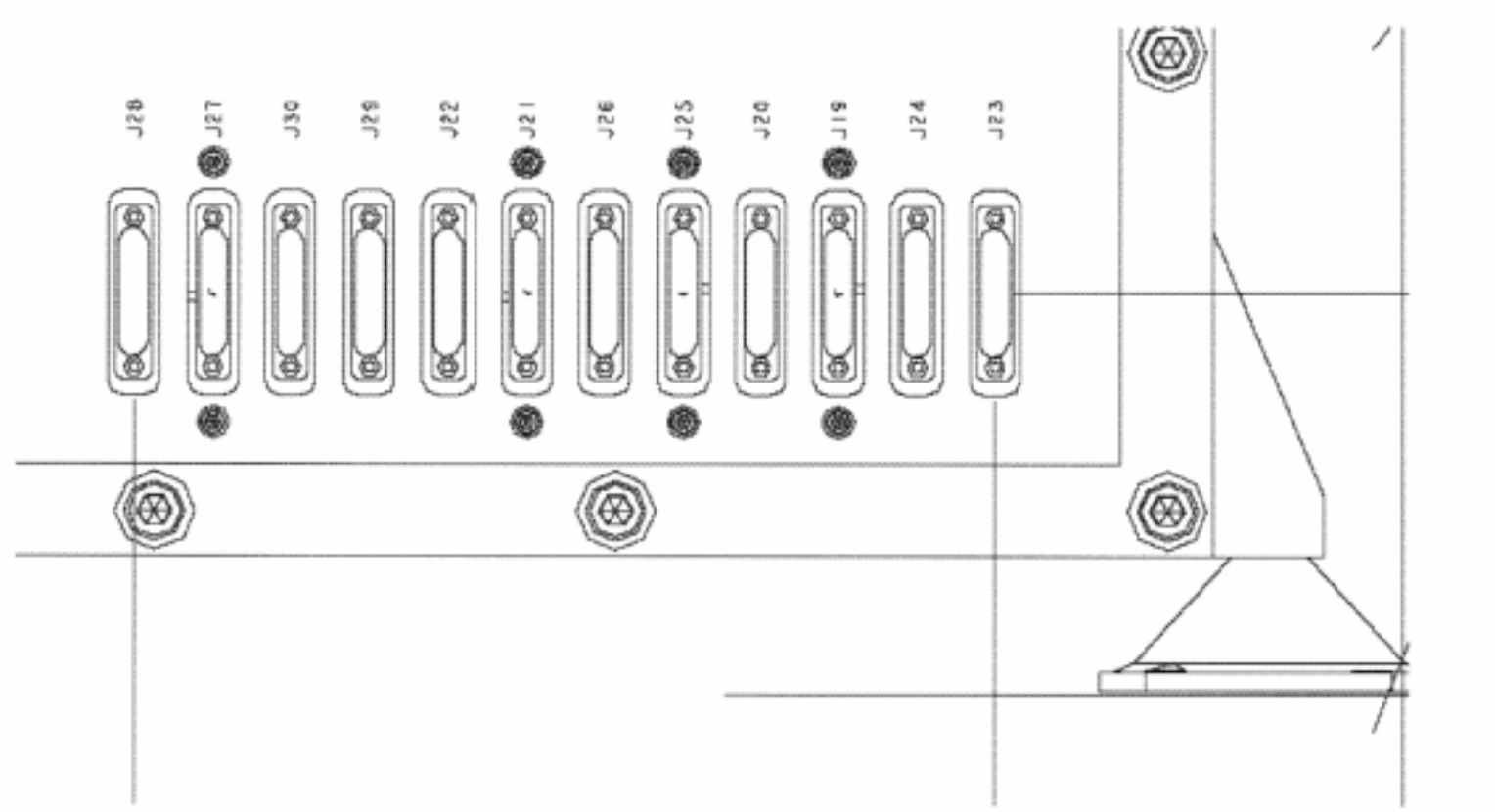

Figure 10.4-2: SPIRE FPU SIH I/F Connectors

SPIRE JFS SIH I/F-Connectors (RD-3)

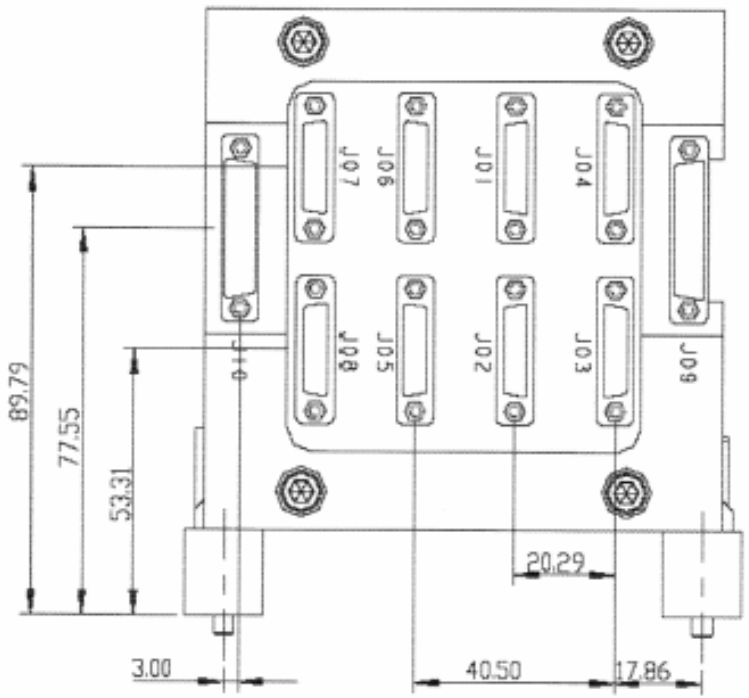

Figure 10.4-4: SPIRE JFS SIH I/F Connectors

SPIRE JFP SIH I/F-Connectors (RD-3)

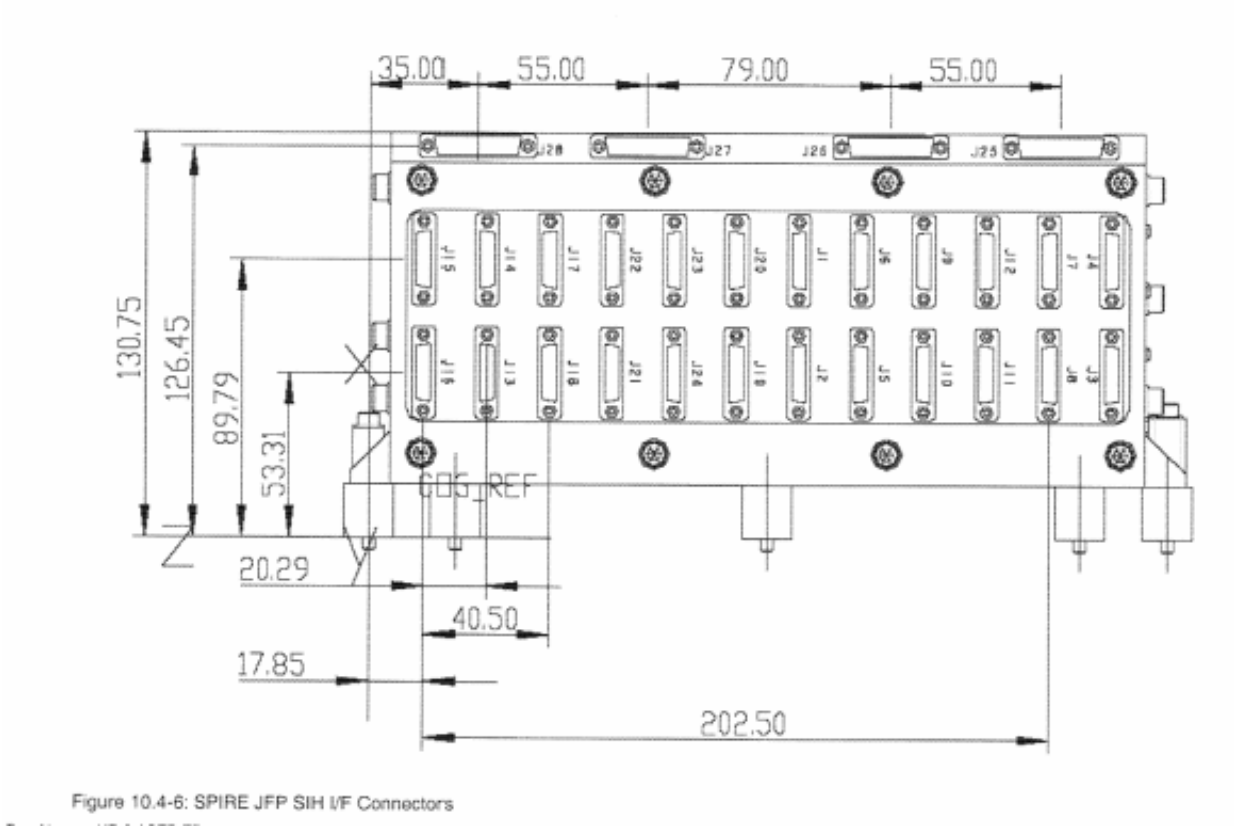

Figure 10.4-6: SPIRE JFP SIH I/F Connectors

End of CVVint SPIRE PFM FPU , JFET & SIH Electrical Integration Procedure

4. APPENDIX 1 – EADS INTEGRATION SEQUENCE EMAIL

From: Idler, Siegmund [Siegmund.Idler@astrium.eads.net]
Sent: 20 March 2007 16:50
To: Sawyer, EC (Eric)
Cc: Bernard.Collaudin@alcatelaleniaspace.com; Guy.Doubrovik@alcatelaleniaspace.com; Benoit.Gobillot@alcatelaleniaspace.com; King, KJ (Ken); Griffin, DK (Doug); 'carsten.scharmberg@esa.int'; Mueller, Martin; Koppe, Axel; Sonn, Nico; Schink, Dietmar
Subject: Instruments El. Integration Flow

Dear Eric,

as agreed during the SPIRE DRB, please find below the instruments electrical integration sequence as currently discussed as option. The major difference to the previous planning is, that - for schedule recovery reasons - the CVV-SVM preliminary mating is cancelled and the first warm test with the integrated instrument is with the evacuated warm CVV. However, the ESA/AAS-F instruction to follow this option is still outstanding! Nevertheless, could you please base your procedures to be delivered on this option since it is the most likely one to be followed.

Activities on SVM

1. Integrate WIH on SVM (already done)
2. Integrate WU on SVM
3. Connect WIH to WU
4. Perform el. integration tests of WU
5. Perform WU functional test (via CCS)
6. Close panel

Activities on EPLM

7. Integrate FPU on OBA
8. Integrate CVV ext. SIH (and connect SIH to CVV feed throughs)
9. Install termination plugs on open ends of CVV ext. SIH (on SVM CB side)
10. Connect SIH to FPU
11. Perform stand alone test with HIFI FPU (using the FCU EQM)
12. Close and evacuate CVV

Activities on S/C

13. Mate CVV with SVM
14. Connect WU to FPU (remove termination plugs and mate SIH at SVM CB)
15. Perform instrument warm functional test

Note: Only those activities are listed which are related to the instrument electrical integration and which support the understanding of it.

Regards

Siegmund