



Herschel – SPIRE

SMEC Interface Control Document

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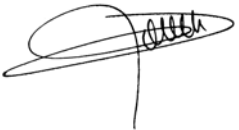


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1 Scope of the document

This document defines the interface specifications between the Spectrometer Mechanism and the SPIRE instrument.

1.1 Applicable document.

n°.	Title of the document	Référence, Iss./Rév.
AD1	SPIRE ICD Structure mechanical Interfaces	SPIRE-MSS-PRJ-000... Iss 1 Apr 2001
AD2	Spectrometer Mirror mechanism subsystem specifications	LAM.PJT.SPI.NOT.200002 Rev 8
AD3	Herschel SPIRE Harness definition	SPIRE-RAL-PRJ-000608 Iss 1 rev 1
AD4	SMEC Mechanical Interface Control Document	SPI-MEC-00-DI-02- E F1 SPI-MEC-00-DI-02- E F2
AD5	FTS/SPIRE bench Interface attachments	SPI-MEC-00-DI-01- A

1.2 Reference document

n°.	Title of the document	Référence, Iss./Rév.
DR1	SPIRE block diagram	SPIRE-RAL-DRW-000646 Iss5 rev3
DR2	SPIRE MCU Flight model interconnection list	LAM.ELE.FTS.NTT.010314

2. Mechanical interface

They are defined in [AD1] and [AD4]

2.1 Overall dimension

The SMEC dimension, excluding the preamplifier printed circuit board, must be within the following envelope:

- ✓ 140 mm x 140 mm in the Xu Zu plane
- ✓ 165 mm, from the SOB contact area, in the + Yu direction, plus the depth of the pocket, located below the contact area, 24 mm in – Yu

These dimensions do not take into account the volume of the preamplifier board located on the side of the SMEC on – Xu side.

The present dimensions of the mechanism are given in [AD4] and the attachment points locations are consistent with the drawing SPI-MEC-00-DI-01 A, agreed by RAL.

2.2 Attachment points

There are four attachment points for the SMEC structure and three attachment points for the SMEC preamplifier PCB

2.2.1 SMEC attachment points

The location of the SMEC four attachment points on the SOB are specified in [AD1]. The attachment points on the SMEC have been located accordingly (see drawings SPI-MEC-00-DI-02-C). There are four attachment holes diameter 5.3 mm for 4 screws 10–32 UNF, provided by RAL.

The tightening torque applied on the screws is 4.3 Nm. There are four Belleville spring washers in parallel mounting under the head of each screw (RAL provision).

2.2.2 SMEC preamplifier attachment points

There are three attachment points , for three 4-40 UNC screws.

The tightening torque to be applied on the screws is 0,76 Nm.

2.3 Flatness specification

2.3.1 SMEC contact area

Due to the tolerance on the SMEC flexure, the deformation of the mechanism after the tightening of the attachments screws shall not exceed 0.01 mm.

In order to meet this specification, the flatness of the four pads of the SOB and of the four contact areas of the SMEC shall be measured with accuracy before integration.

Should a flatness default be identified, at least one thin stainless steel shim would be used to avoid any deformation of the structure or to limit it within the allowed range (0.01 mm).

2.3.2 Preamplifier card

There are three contact areas for the preamplifier card attachment. On an other hand, the preamplifier frame is attached on the SMEC baseplate by means of 2 attachment points.

A dedicated mounting procedure of the SMEC on the SOB will be written and provided by LAM.

2.4 Dynamical behaviour

The first eigen frequency of the equipment shall be higher than 170 Hz.

2.5 Thermal sensor

Two thermal sensors provided by RAL are integrated on the mechanism. The sensors are cernox ref : CX-1030-SD-HT integrated in a housing provided by RAL.

Each sensors housing is attached by means of M2.5 screw.

The shape of the thermal sensor housing is given here after

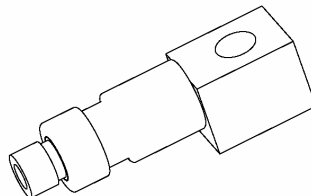


Figure 1 : SMEC thermal sensor general shape

The thermal sensor location are given on figure 2

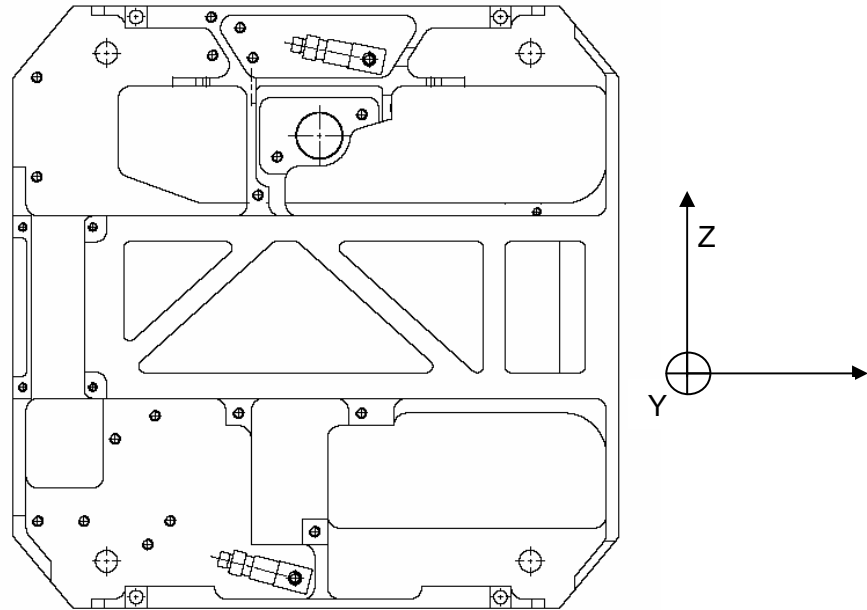


Figure 2 :SMEC Thermal sensor location

The thermal sensor interface characteristics are given here after.

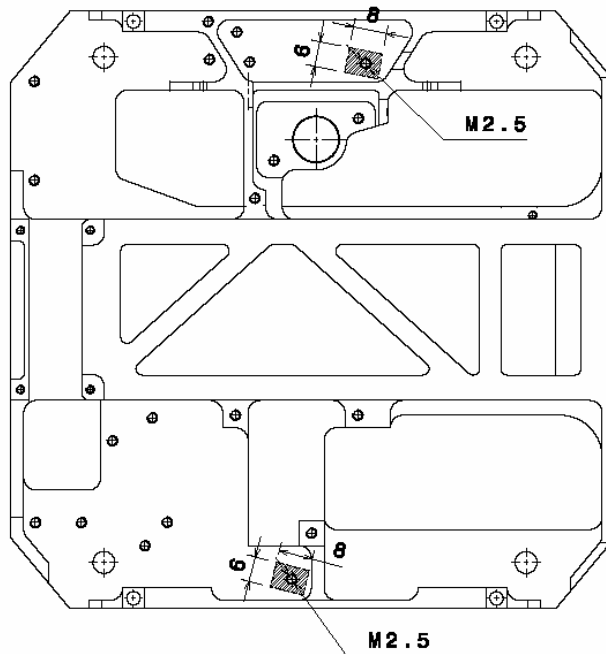


Figure 3 : Thermal interface contact area and attachment characteristics



2.6 Mechanical Interface Control Drawing (MICD)

A MICD giving the SMEC interface definition is given page 8 and 9 .

3. Mass-CoG

3.1 Mass Allocation and COG

The allocated mass and CoG location are given on the MICD.

4. Thermal Interface

4.1 Functioning mode definition

There is only one functioning mode, when the roof top mirrors are moving along their trajectory.

4.2 Dissipated power

The power dissipated by the SMEC in operating mode will not be higher than 2,4 mW

4.3 Thermal finishes properties

SMEC Structure (Alodine 1200)

Absorptivity $\alpha = 0,39$

Emissivity $\varepsilon = 0,06$

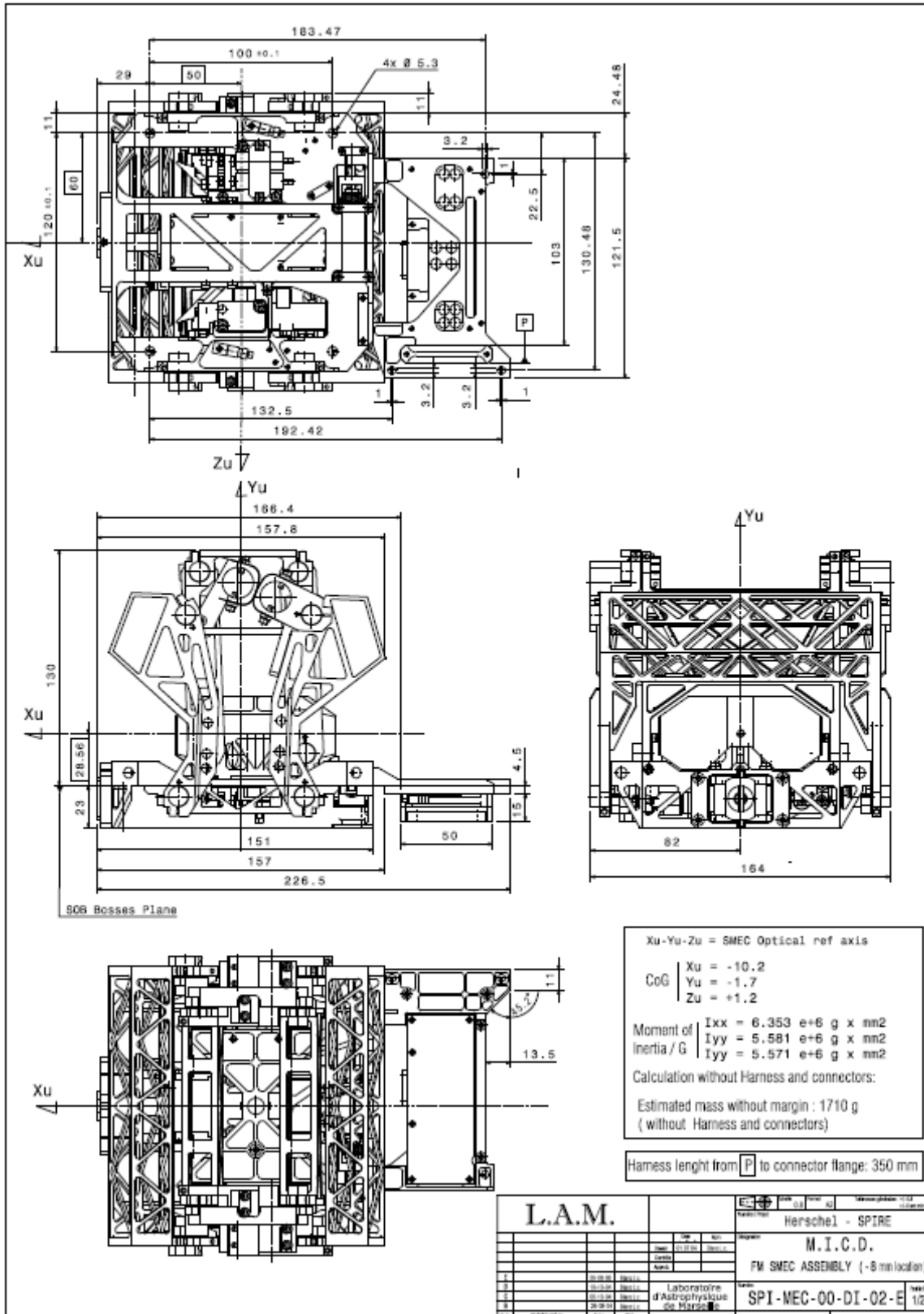
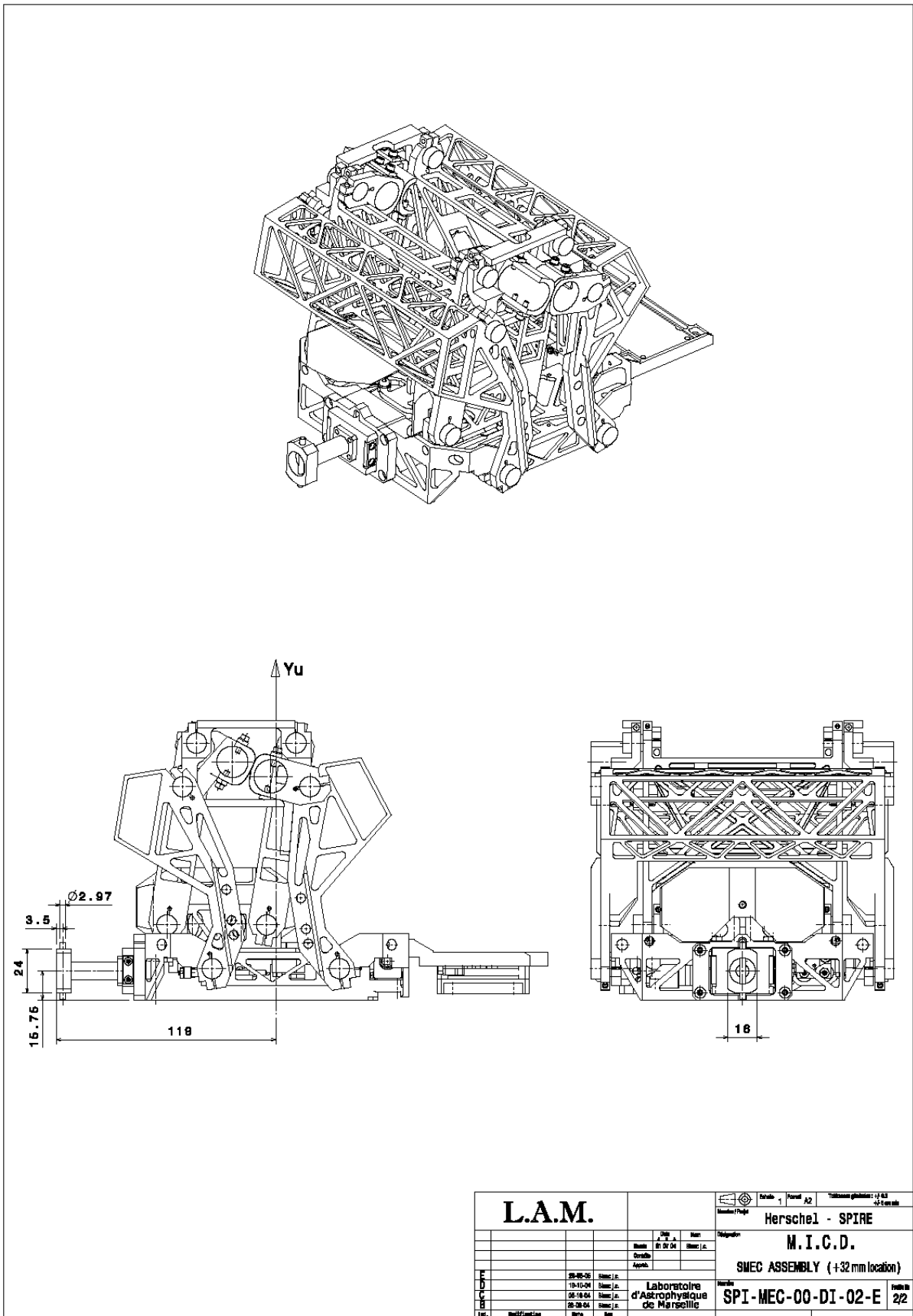


Figure 4 : SMEC MICD Page 1/2



L.A.M.		Scale: 1 / Format: A2 / Taille graphique: 11.83 x 16.51 mm	
		Number/ Page: Herschel - SPIRE	
		Design: M. I. C. D.	
		SMEC ASSEMBLY (+32 mm location)	
		Number: SPI-MEC-00-DI-02-E / Edition: 2/2	
E D C B A	25-02-05 / Date: / Rev: /	Laboratoire d'Astrophysique de Marseille	
	19-10-04 / Date: / Rev: /		
	05-18-04 / Date: / Rev: /		
	20-08-04 / Date: / Rev: /		
Inc. /	M.I.C.D. /	Date: /	Rev: /

Figure 5 : SMEC MICD page 2/2

5. Electrical Interface

5.1 Grounding

The SMEC Structure is in aluminium. Every contact area with the SOB will be treated with Alodine 1200 in order to allow a good electrical conductivity.

5.2 Harness definition

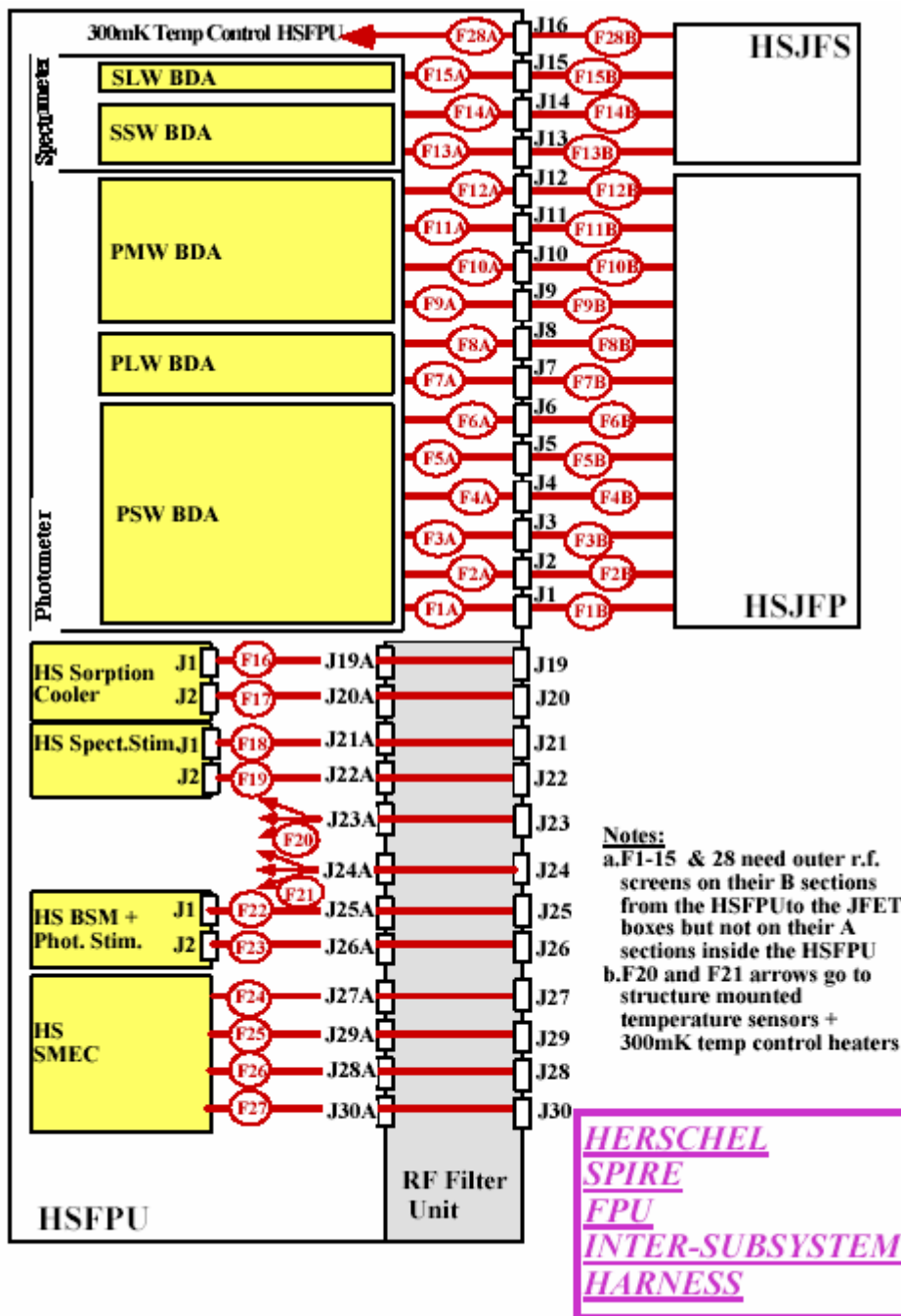


Figure 6: Inter-Subsystem harness definition

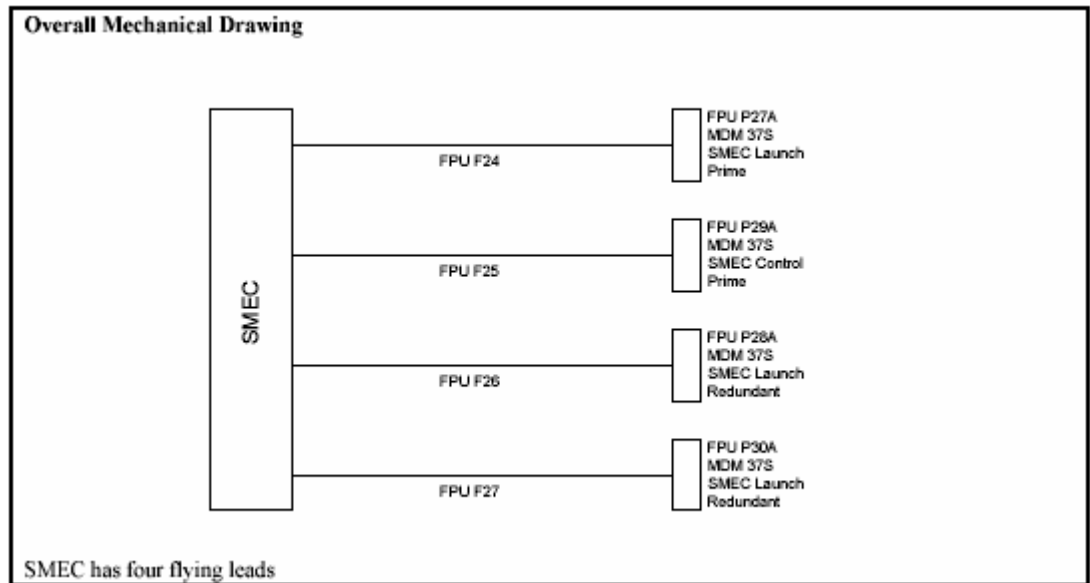
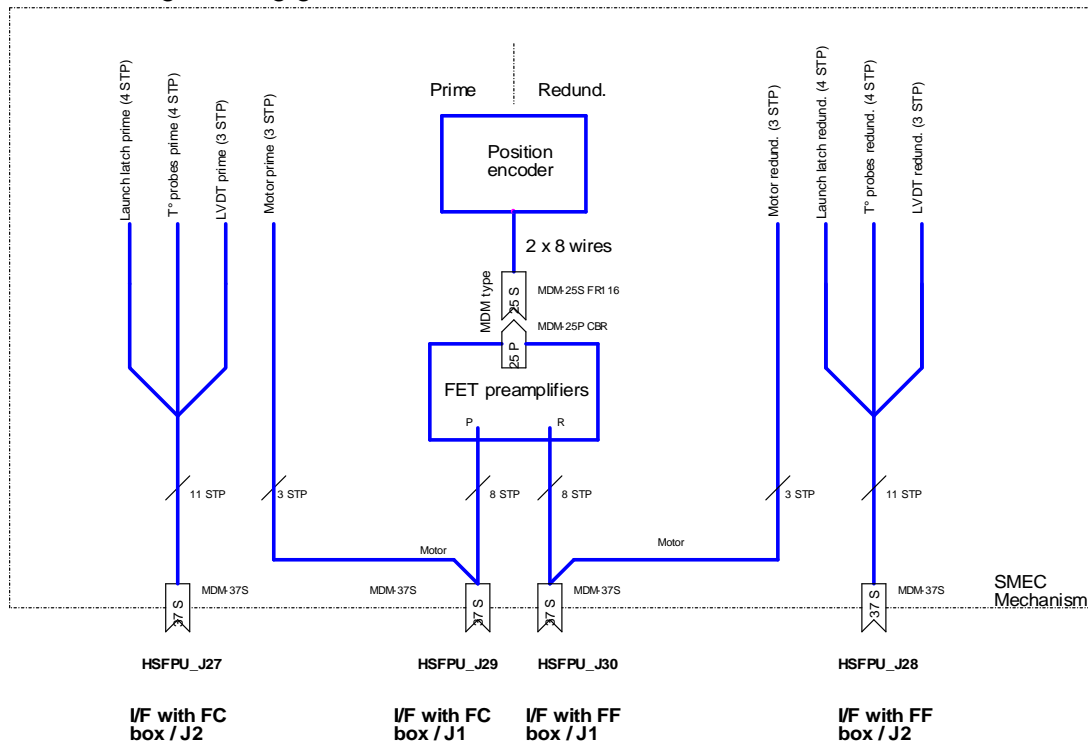


Figure 7: SMEC Harness definition

5.3 SMEC Harness interconnection

The following drawing gives the SMEC harness interconnections



Laboratoire d'Astrophysique de Marseille			
Title SMEC/FTS/mechanism - INTERCONNECTIONS			
Size A4	Document Number LAM/ELE/FTS/GEN/00-12		Rev 3.0
Date:15-01-2002	Sheet 1 of 1		

Figure 8 SMEC harness interconnections



5.4 Connector definition

Designation	Function	Line	Harness designation	Connector type
FPU J 27A	SMEC Launch	Prime	FPU F24	MDM 37S
FPU J 28A	SMEC Launch	Redundant	FPU F26	MDM 37S
FPU J 29A	SMEC Control	Prime	FPU F25	MDM 37S
FPU J 30A	SMEC Control	Redundant	FPU F27	MDM 37S

Table 1 : SMEC connector definition

All connectors are equipped with EMI backshells

EMC braid is installed over the harnesses and terminated at the backshells



5.5 Pin allocation

5.5.1 Prime

5.5.1.1 Connector J 29 A

Identification : HSFPU_J29, located on the cable of SMECm

Type : MDM 37S

Functions : motor (3 STP), encoder (8 STP), 11 screens

Connected to RF filter box / J29A

37 way FPU_J29	Signal function	Signal name	Max. current	Wire type
1	SMEC drive coil I+	S_Mot_Coil_P	100 mA	Insulated STP
2	SMEC drive coil I-	S_Mot_Coil_N	100 mA	
20	SMEC drive coil shield	S_Mot_Coil_Shd	N/A	
4	SMEC drive coil supply sense	S_Mot_Bemf_P	10 µA	Insulated STP
5	SMEC drive coil return sense	S_Mot_Bemf_N	10 µA	
23	SMEC drive coil supply sense shield	S_Mot_Bemf_Shd	N/A	
7	SMEC position sensor Led power supply	LEDA	1 mA	Insulated STP
8	SMEC position sensor Led power return	LEDC	1 mA	
26	Shield	LED_Shd	N/A	
10	SMEC position sensor photodiode #1 I+	IPD1A	20 µA	Insulated STP
11	SMEC position sensor photodiode #1 I-	IPD1C	20 µA	
29	Shield	IPD1_SHD	N/A	
13	SMEC position sensor photodiode #2 I+	IPD2A	20 µA	Insulated STP
14	SMEC position sensor photodiode #2 I-	IPD2C	20 µA	
32	Shield	IPD2_Shd	N/A	
16	SMEC position sensor photodiode #3 I+	IPD3A	20 µA	Insulated STP
17	SMEC position sensor photodiode #3 I-	IPD3C	20 µA	
35	Shield	IPD3_Shd	N/A	
21	SMEC drive coil I+ (rob)	S_Mot_Coil_P	100 mA	Insulated STP
22	SMEC drive coil I- (rob)	S_Mot_Coil_N	100 mA	
3	SMEC drive coil shield rob)	S_Mot_Coil_Shd	N/A	
27	SMEC position sensor power supply	-3V	1 mA	Insulated STP
28	SMEC position sensor power return	-3V	1 mA	
9	Shield	POS_POWER_Shd	N/A	
30	SMEC pos. sensor photodiode #1 feedback +	CRPD1A	10 µA	Insulated STP
31	SMEC pos. sensor photodiode #1 feedback -	CRPD1C	10 µA	
12	Shield	CRPD1_SHD	N/A	
33	SMEC pos. sensor photodiode #2 feedback +	CRPD2A	10 µA	Insulated STP
34	SMEC pos. sensor photodiode #2 feedback -	CRPD2C	10 µA	
15	Shield	CRPD2_Shd	N/A	
36	SMEC pos. sensor photodiode #3 feedback +	CRPD3A	10 µA	Insulated STP
37	SMEC pos. sensor photodiode #3 feedback -	CRPD3C	10 µA	
18	Shield	CRPD3_Shd	N/A	
6	NC			
19	NC			
24	NC			
25	NC			

Table 2 : J 29 A Pin allocation

**5.5.1.2 Connector J 27 A****Identification** :HSFPU_J27, located on the cable of SMECm**Type** : MDM 37S**Functions** : LVDT (3 STP), launch latch (6 STP), t° probes (4 STP), 13 screens

Connected to RF filter box / J27A

37 way FPU_J27	Signal function	Signal name	Max. current	Wire type
22	SMEC launch latch #1 power supply A	S_LL#1_Coil_P	300 mA / 100 ms	Insulated STP
23	SMEC launch latch #1 power return A	S_LL#1_Coil_N	300 mA / 100 ms	
4	Shield	S_LL#1_Coil_Shd	N/A	
5	SMEC launch latch #1 power supply B	S_LL#1_Coil_P	300 mA / 100 ms	Insulated STP
6	SMEC launch latch #1 power return B	S_LL#1_Coil_N	300 mA / 100 ms	
24	Shield	S_LL#1_Coil_Shd	N/A	
28	SMEC temperature I+		1 µA	Insulated STP
11	SMEC temperature I-		1 µA	
10	SMEC temperature V+		N/A	
29	SMEC temperature V-		N/A	
30	Shield		N/A	
31	SMEC/SOB I/F temperature I+		1 µA	Insulated STP
14	SMEC/SOB I/F temperature I-		1 µA	
13	SMEC/SOB I/F temperature V+		N/A	
32	SMEC/SOB I/F temperature V-		N/A	
12	Shield		N/A	
2	SMEC launch latch # 2 confirmation + (TBC)	S_LL#2_Stat_P	1 mA	Insulated STP
21	SMEC launch latch # 2 confirmation - (TBC)	S_LL#2_Stat_N	1 mA	
3	Shield	S_LL#2_Stat_Shd	N/A	
33	SMEC LVDT primary coil power supply (P)	LVDT_PRIM_P	5 mA	Insulated STP
34	SMEC LVDT primary coil power supply (N)	LVDT_PRIM_N	5 mA	
15	Shield	LVDT_PRIM_Shd	N/A	
35	SMEC LVDT secondary coil # 1 signal (P)	LVDT_SECA_P	50 µA	Insulated STP
36	SMEC LVDT secondary coil # 1 signal (N)	LVDT_SECA_N	50 µA	
17	Shield	LVDT_SECA_Shd	N/A	
18	SMEC LVDT secondary coil # 2 signal (P)	LVDT_SECB_P	50 µA	Insulated STP
19	SMEC LVDT secondary coil # 2 signal (N)	LVDT_SECB_N	50 µA	
37	Shield	LVDT_SECB_Shd	N/A	
25	SMEC launch latch #2 power supply A	S_LL#2_Coil_P	300 mA / 100 ms	Insulated STP
26	SMEC launch latch #2 power return A	S_LL#2_Coil_N	300 mA / 100 ms	
7	Shield	S_LL#2_Coil_Shd	N/A	
8	SMEC launch latch #2 power supply B	S_LL#2_Coil_P	300 mA / 100 ms	Insulated STP
9	SMEC launch latch #2 power return B	S_LL#2_Coil_N	300 mA / 100 ms	
27	Shield	S_LL#2_Coil_Shd	N/A	
1	SMEC launch latch # 1 confirmation +	S_LL#1_Stat_P	1 mA	Insulated STP
20	SMEC launch latch # 1 confirmation -	S_LL#1_Stat_N	1 mA	
3	Shield	S_LL#1_Stat_Shd	N/A	
16	NC			

Table 3 : J 27 A pin allocation



5.5.2 Redundant

5.5.2.1 Connector J 30

Identification :HSFPU_J30, located on the cable of SMECm

Type : MDM 37S

Functions : motor (3 STP), encoder (8 STP), 11 screens

Connected to RF filter box / J30A [RD2]

Pinout : Same as HSFPU_J29

5.5.2.2 Connector J 28

Identification :HSFPU_J28, located on the cable of SMECm

Type : MDM 37S

Functions : LVDT (3 STP), launch latch (4 STP), t° probes (4 STP), 11 screens

Connected to RF filter box / J28A [RD2]

Pinout : Same as HSFPU_J27

5.6 Harness length

The length of the harness, from the external side of the clamp located on the preamplifier PCB to the external side of the connector is 350 mm.