

SPIRE

SUBJECT: SPIRE PFM FPU Mechanical Interface Verification

PREPARED BY: E Sawyer

DOCUMENT No: SPIRE-RAL-DOC- 002830

ISSUE: 2

Date: 26/3/07

CHECKED BY:

APPROVED BY:

Change Record

ISSUE	DATE	
1	20/2/07	Prepared for PFM EIDP
2	26/3/07	Measurements of thermal interfaces added.

Table of Contents

SPIRE	1
SPIRE PFM FPU MECHANICAL INTERFACE VERIFICATION	1
CHANGE RECORD	2
1. SCOPE	2
2. APPLICABLE DOCUMENTS	3
3. REFERENCE DOCUMENTS	3
4. MEASUREMENTS	4
5. ANNEX A INTERFACE DRAWING SHEETS 1 AND 2	6

1. SCOPE

This document reports on the measurements taken on the SPIRE PFM FPU and JFETS.

Measurements were taken and compared to the MICD ref AD 1.

It was not possible to measure the foot print of the isostatic mounts of the FPU. A HOB simulator plate is used during the AIT of the FPU and JFETS. This interface plate was manufactured to the dimension in AD 1. The inspection report shows that most holes lie within the +/- 0.1mm tolerance, the maximum deviation from true position is 0.149mm for the FPU and 0.191mm for the spectrometer JFET.

The FPU and JFETS fit this plate correctly and also the cryo-vibration adaptor made by CSL to the same interface dimensions.

The CQM FPU and JFETS have been fitted to the EQM and PFM Herschel OBA.

The hole positions of the L0 thermal straps were measured with a dowel and vernier callipers.

2. APPLICABLE DOCUMENTS

AD 1	5264 300 issue 20	SPIRE mechanical interface drawing Extract included as annex A
AD 2	0-KE-0104-250-J	6 JFET rack interface drawing
AD 3	0-KE-0104-260-L	2 JFET rack interface drawing

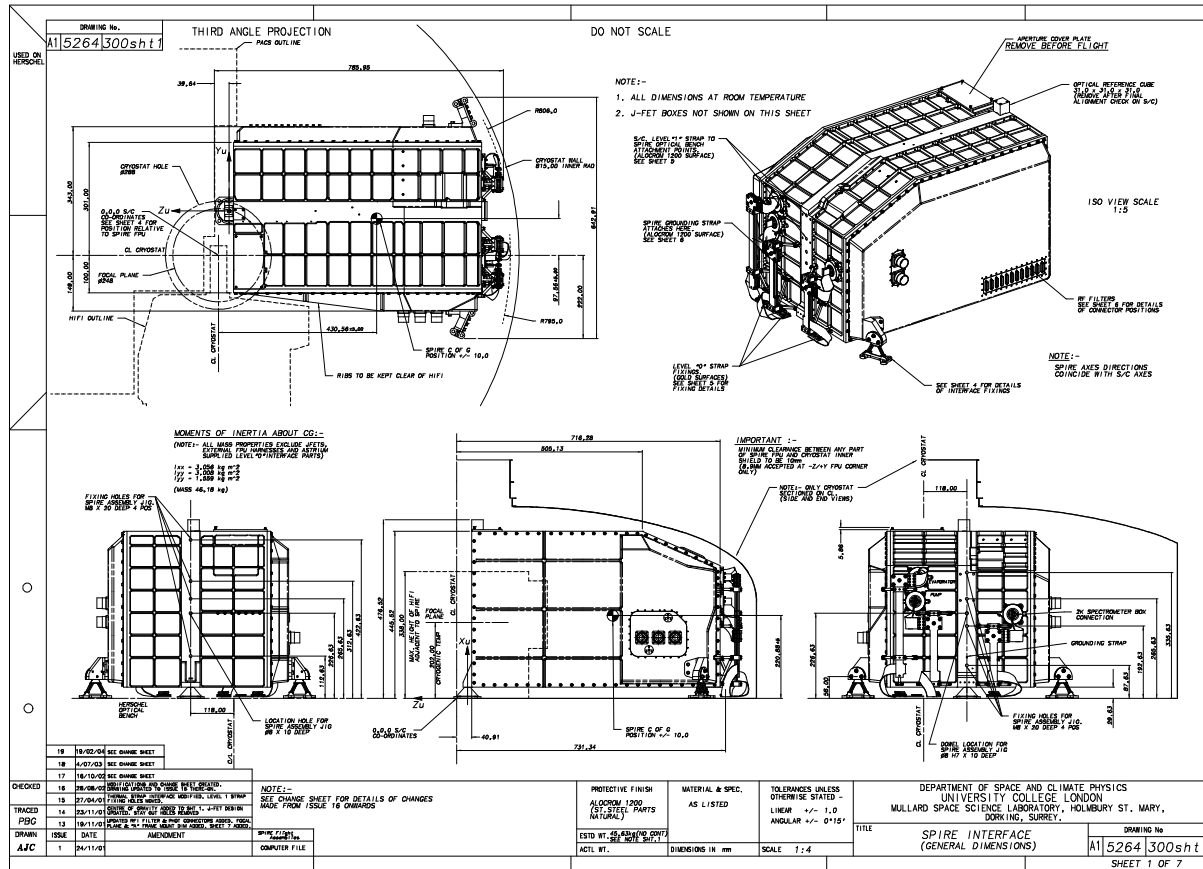
3. REFERENCE DOCUMENTS

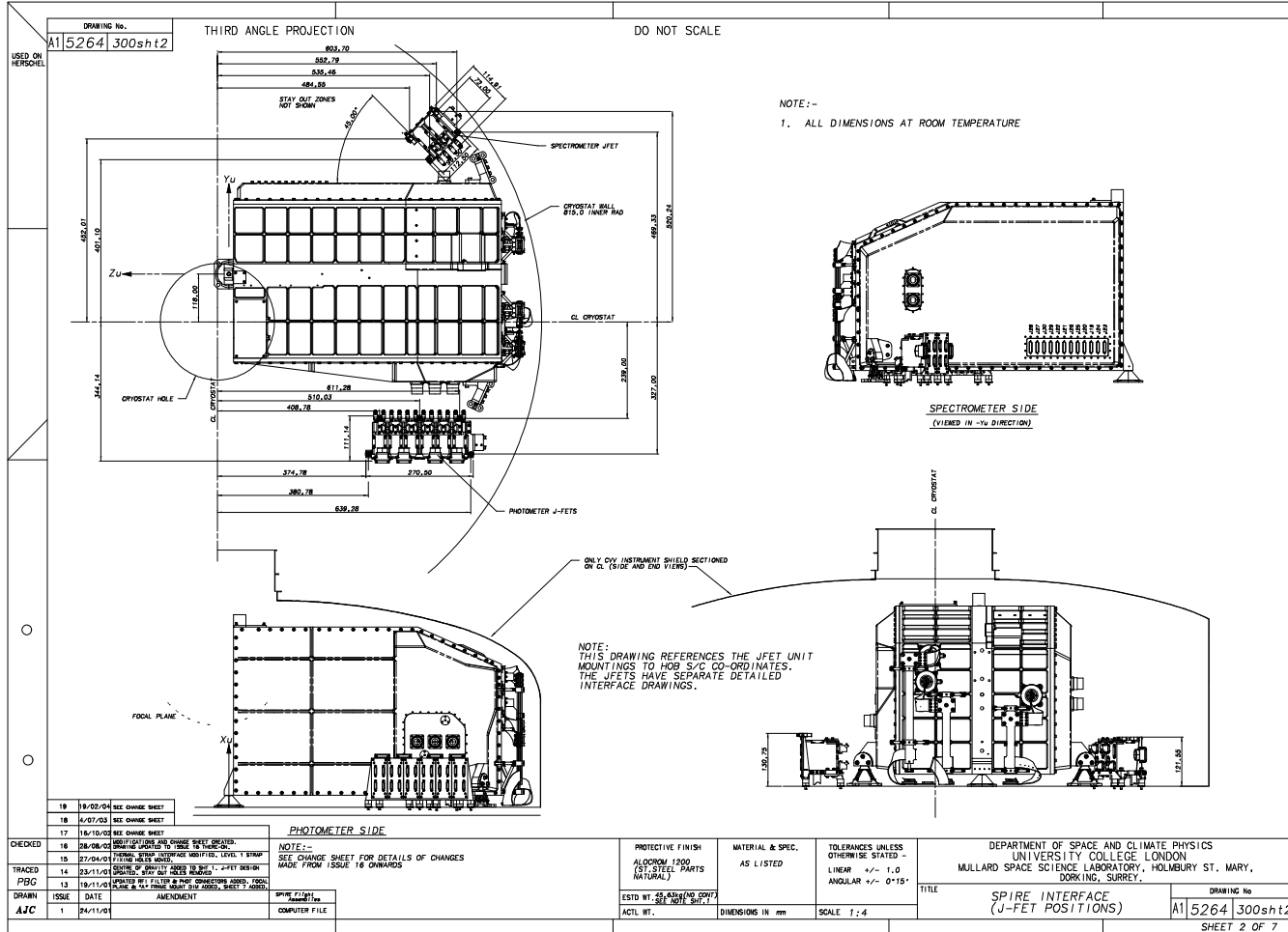
4. MEASUREMENTS

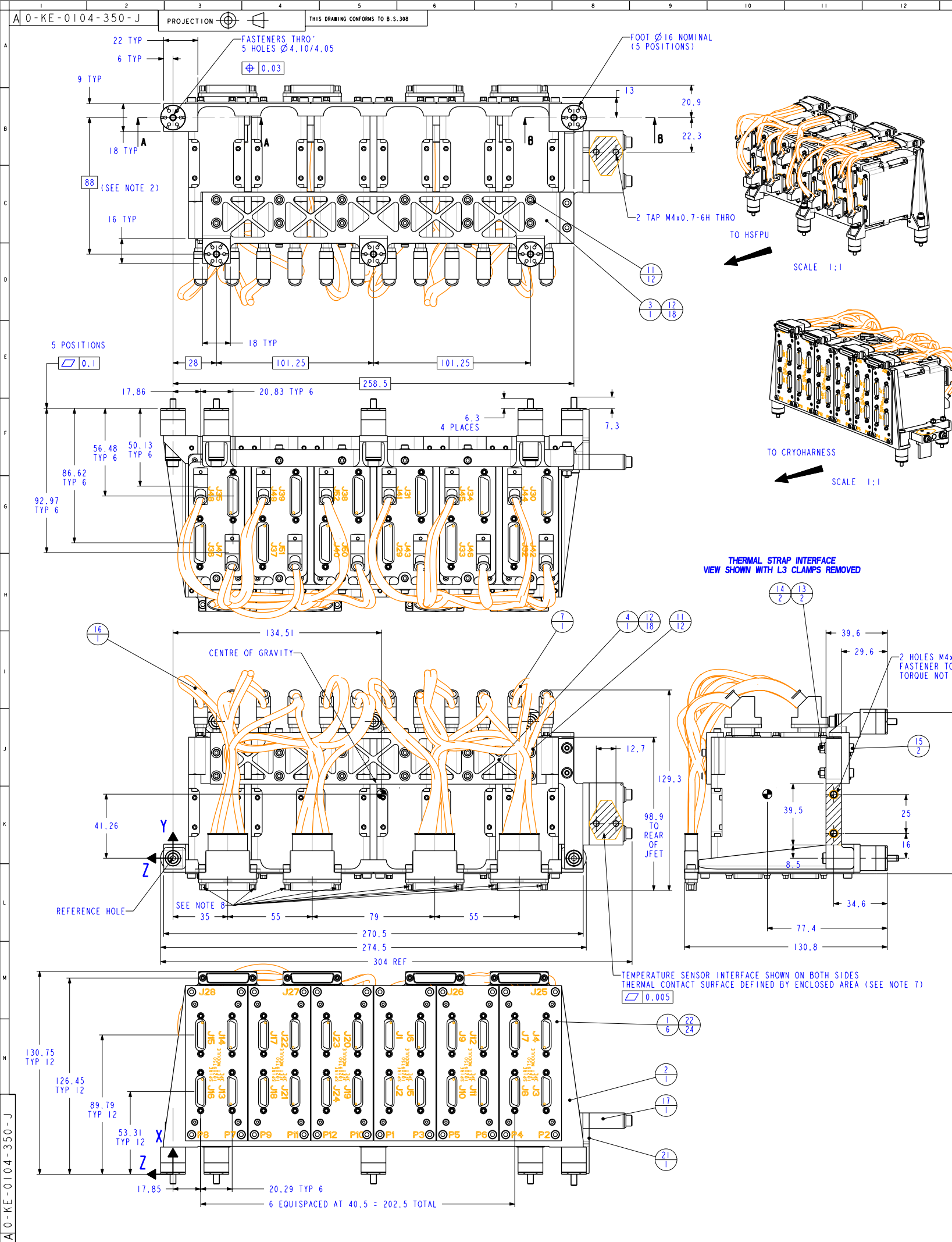
Drawing sheet No	Description	Dimension on drawing	Tolerance on drawing	Measured dimension	Measurement accuracy	Compliance
5264 300 /1	Overall length of FPU	675.37 716.28 – 40.91	+/- 1.0	676	+/- 0.5	Yes
	Overall length including L0 straps	749.04 789.95 – 40.91	+/- 1.0	750	+/- 0.5	Yes
	Overall height excluding cube	445.52	+/- 1.0	445.2	+/- 0.5	Yes
	Overall width excluding connectors	492 (149 + 343)	+/- 1.0	492	+/- 0.5	Yes
	Overall width across A frame feet	642.91	+/- 1.0	643	+/- 0.5	Yes
	L0 interface height 1	265.63	+/- 1.0	365	+/- 0.5	Yes
	L0 interface height 2	335.63	+/- 1.0	336	+/- 0.5	Yes
5264 300 /2	Height of photometer JFET	130.75	+/- 1.0	131.7	+/- 0.5	Yes
	Height of Spectrometer JFET	121.55	+/- 1.0	122	+/- 0.5	Yes
5264 300 /5	L0 thermal strap interfaces					
	Evaporator	15.0	+/- 1.0	15.0	+/- 1.0	Yes
		12.7	+/- 1.0	12.65	+/- 1.0	Yes
		29.0	+/- 1.0	29.0	+/- 1.0	Yes
		15.0	+/- 1.0	15.0	+/- 1.0	Yes
		46.75	+/- 1.0	47.7	+/- 1.0	Yes
		Diameter 4.5 in 10 positions	+/- 1.0	4.5 +/- 0.05		Yes
	Pump	15.0	+/- 1.0		+/- 1.0	Yes
		29.0	+/- 1.0		+/- 1.0	Yes
		12.7	+/- 1.0		+/- 1.0	Yes
		Diameter 4.5 in 6 positions	+/- 1.0	4.5 +/- 0.05	+/- 1.0	Yes
	Detector	15.0	+/- 1.0		+/- 1.0	Yes
		29.0	+/- 1.0		+/- 1.0	Yes
		12.7	+/- 1.0		+/- 1.0	Yes
		Diameter 4.5 in 6 positions	+/- 1.0	4.5 +/- 0.05	+/- 1.0	Yes

	L1 thermal interface	36.0	+/- 1.0	36.0	+/- 1.0	Yes
		4.5	+/- 1.0	4.5	+/- 1.0	Yes
		36.0	+/- 1.0	36.0	+/- 1.0	Yes
		4.5	+/- 1.0	4.5	+/- 1.0	Yes
0-KE-0104-350	L3 thermal interface.	Hole ctrs 25.0	+/- 1.0	25.0	+/- 1.0	Yes
0-KE-0104-360	L3 thermal interface.	Hole ctrs 25.0 (48.5-23.5)	+/- 1.0	25.0	+/- 1.0	Yes

5. ANNEX A INTERFACE DRAWING SHEETS 1, 2 and 5

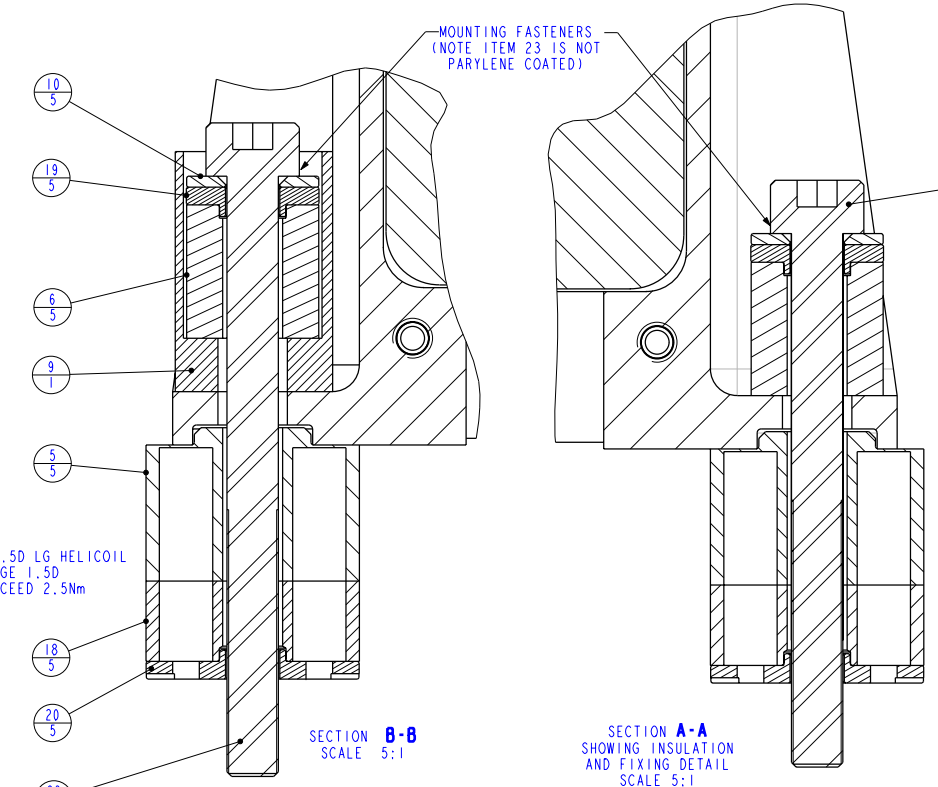
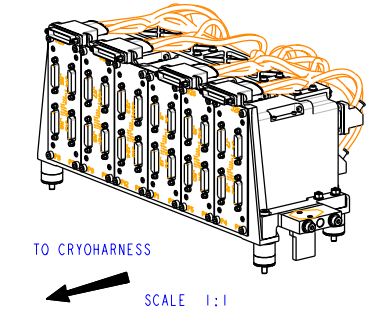
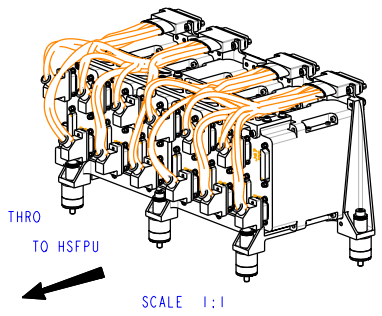






MOMENTS OF INERTIA (kg.mm ²) WITH RESPECT TO C OF G	
I_{xx}	1.70e+04
I_{yy}	1.66e+04
I_{zz}	4.73e+03

ITEM	PART NO.	DESCRIPTION	QTY	MASS/ITEM	TOTAL MASS	COMMENTS
1	23836-10209722	JFET MODULE	6	260.00	1560.00	JPL SUPPLY
2	KE-0104-351	FRONT PLATE 6 JFET	1	128.66	128.66	
3	KE-0104-352	REAR FOOT BEAM - 6 JFET	1	69.55	69.55	
4	KE-0104-353	REAR TOP BEAM - 6 JFET	1	32.56	32.56	
5	KE-0104-354	STEPPED THERMAL STANDOFF	5	1.70	8.50	
6	KE-0104-355	TOP THERMAL STANDOFF	5	0.87	4.34	
7	10209785_1	BACKHARNES (10209785_1)	1	265.65	265.65	JPL SUPPLY
8	KE-0104-358	M4 BOLT (PARYLENE C COATED 26.5mm)	4	4.70	18.78	
9	KE-0104-359	THERMAL STRAP ASSY - 6 JFET	1	23.76	23.76	
10	KE-0104-367	THERMAL STANDOFF WASHER	5	0.39	1.94	
11	M2-5_WASHER	WASHER	24	0.11	2.57	S/STEEL BS970/1501 304S 11/15/31
12	M2-5_X_8LG_CPHD_SKT_SS	FASTENER	36	0.58	20.79	S/STEEL BS3506-1:1998 A2-70
13	M3_NUT	NUT	2	0.48	0.97	S/STEEL BS6105 A2-50 DIN 912
14	58-3205	BELLEVILLE WASHER	2	0.17	0.33	BELLEVILLE SPRINGS LTD, BATCH 17415
15	M3_X_20LG_CPHD_SKT_SS	FASTENER	2	1.26	2.52	S/STEEL BS3506-1:1998 A2-70
16	10209786_1	BACKHARNES (10209786_1)	1	267.70	267.70	JPL SUPPLY
17	KE-0104-393	L3 INTERFACE ASSY	1	64.18	64.18	
18	KE-0104-397	THERMAL STANDOFF BUSH	5	0.94	4.70	
19	KE-0104-398	FOOT UPPER WASHER	5	0.14	0.69	
20	KE-0104-399	FOOT LOWER WASHER	5	0.34	1.69	
21	L3_STRAP_B	L3 STRAP	1	N/A		HERSCHEL SUPPLY
22	M3_X_8LG_CPHD_SKT_SS	FASTENER	24	0.74	17.86	S/STEEL BS3506-1:1998 A2-70
23	M4_X_45LG_CPHD_SKT_SS	FASTENER	1	5.15	5.15	S/STEEL BS3506-1:1998 A2-70
				ASSEMBLY MASS	2502.88 GRAMS	

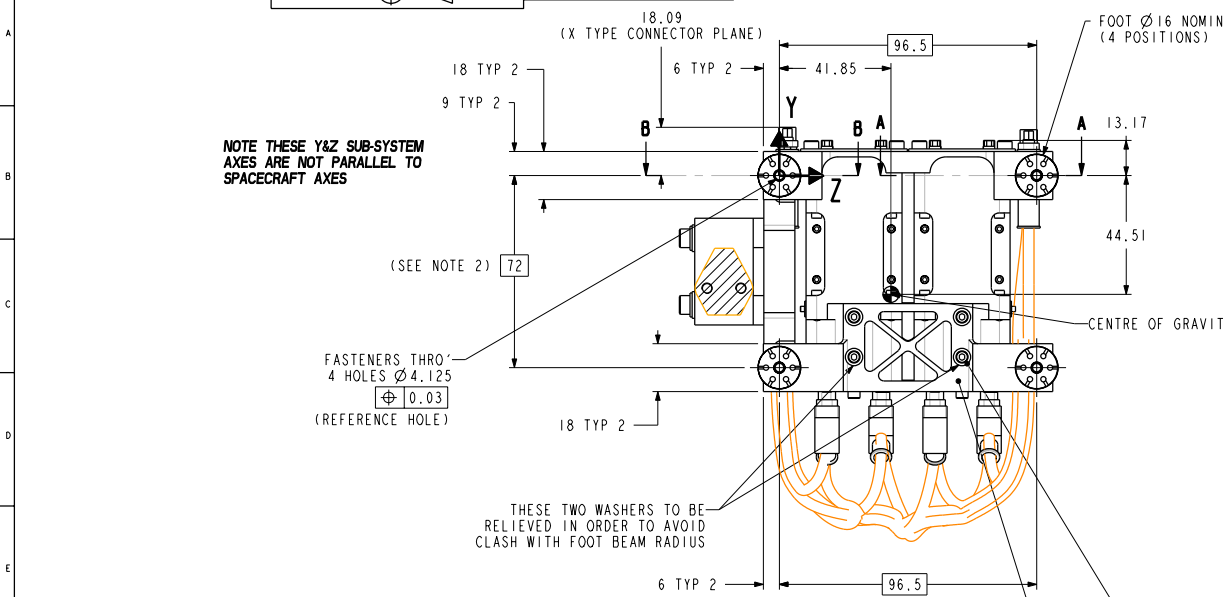


CONNECTOR TABLE		
LABEL	TYPE	FUNCTION
J1		ALL SIGNAL FEEDS TO CRYOHARNES
J2		
J3		
J4		
J5		
J6		
J7		
J8		
J9		
J10		
J11		
J12		
J13		
J14		
J15		
J16		
J17		
J18		
J19		
J20		
J21		
J22		
J23		
J24		
J25		
J26		
J27		
J28		
J29		
J30		
J31		
J32		
J33		
J34		
J35		
J36		
J37		
J38		
J39		
J40		
J41		
J42		
J43		
J44		
J45		
J46		
J47		
J48		
J49		
J50		
J51		
J52		

- NOTES:-
- ITEM 19 TO BE BONDED TO ITEM 6 PRIOR TO ASSEMBLY. ITEMS 20 & 18 TO BE BONDED TO ITEM 5 PRIOR TO ASSEMBLY. ITEMS 5 & 6 TO BE PERMANENTLY GLUED TO MATING SURFACES.
 - TO ATTAIN THE CORRECT MOUNTING INTERFACE DIMENSION, AND TO COMPENSATE FOR ACTUAL JFET MODULE SIZES, THE FOLLOWING PROCEDURE MUST BE FOLLOWED: PARTS 1 ARE TO BE MOUNTED TO PART 2. MEASURE FROM THE TOP OF PARTS 1 SHOWN AS PLANE 'C' TO THE TAIL END FACE OF PART 2, NOTING THE SIX VALUES. MACHINE RAISED PADS ON PART 3 TO REMOVE (VALUE - 87.7). PADS ON ITEM 4 WILL ALSO NEED MACHINING IF TRIAL ASSEMBLY OF RACK ON FLAT SURFACE SHOWS GAPS BEFORE FASTENERS ARE TIGHTENED.
 - ITEMS 22 AND 8 TO BE TORQUED TO 2.1 Nm ABOVE LOCKING INSERT RUNNING TORQUE.
 - UNIT SHOWN FITTED WITH BACK-HARNES MATING TO J25-28 & J41-52 BECAUSE THIS WILL BE FITTED BEFORE ITEM IS INTEGRATED TO HOB.
 - HEAT CAPACITY AT RT = 2100 JOULES / KELVIN.
 - FITTED BACKHARNES TO AFFORD OPEN ACCESS TO 51 WAYS AS SHOWN.
 - AFFIX ONE SENSOR WITH LONG BOLTS AND THEN THE OTHER ON THE REVERSE WITH NUTS
 - ONLY 3mm JACSREW LENGTH GUARANTEED BELOW MOUNTING PLANE
 - INNER SURFACES OF PARTS 5, 6 AND 18 TO BE CLEAN OF CARBON WHISKERS AND OVERCOATED WITH D222A AFTER ASSEMBLY.

J	05-AUG-05	KE-2953.	D. SMART			ISSUED
ISSUE	DATE	MOD. No.	DRN. BY	CHKD.	APPD.	STATUS
TOLERANCES UNLESS STATED		FINISH		ORIGINAL SCALE		
±0.2 mm		CLEAN		1:1		
±0.3		REMOVE ALL BURRS		DO NOT SCALE		
MATERIAL & SPEC.		SURFACE TEXTURE µm		SEE DETAILS		
SEE DETAILS		UNLESS STATED		0 50mm		
USED ON					©CLRC 2005	
CENTRAL LABORATORY OF THE RESEARCH COUNCILS						
TITLE						
6 JFET RACK INTERFACE DRAWING						
SPIRE						
A 0-KE-0104-350-J						1 OF 1

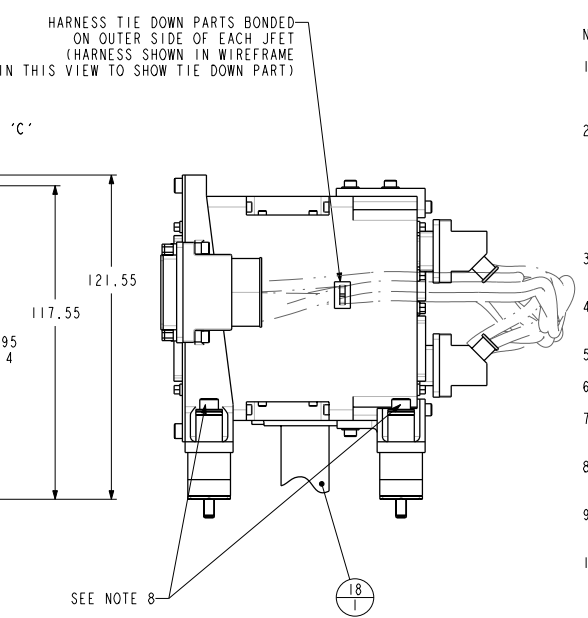
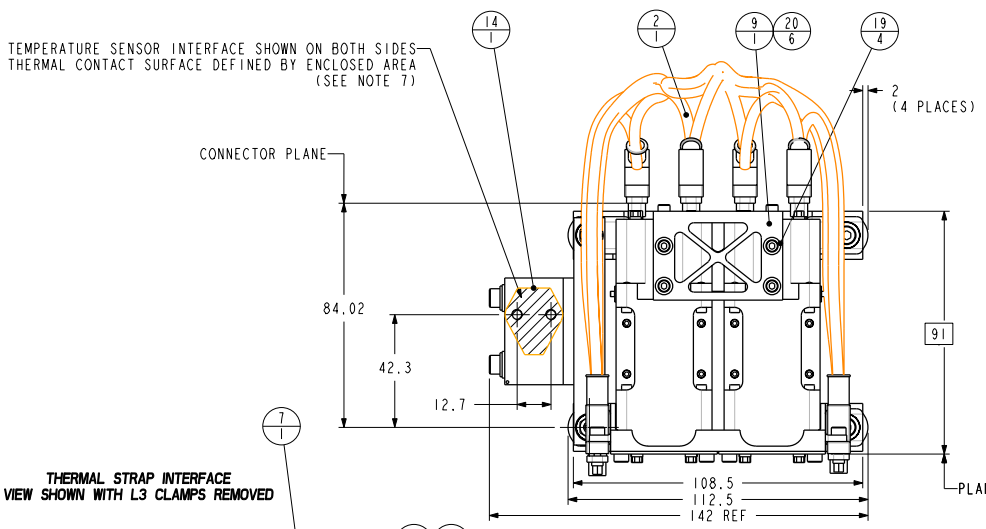
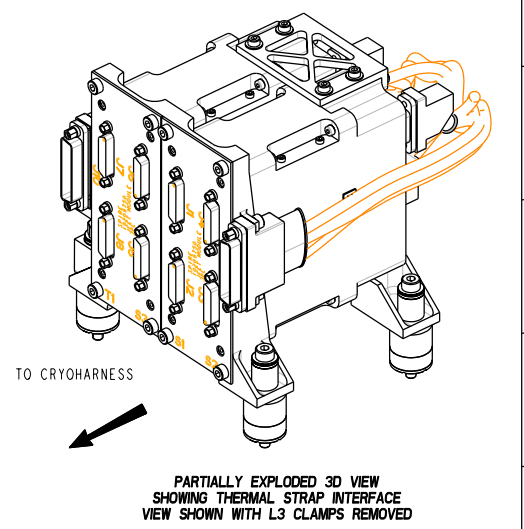
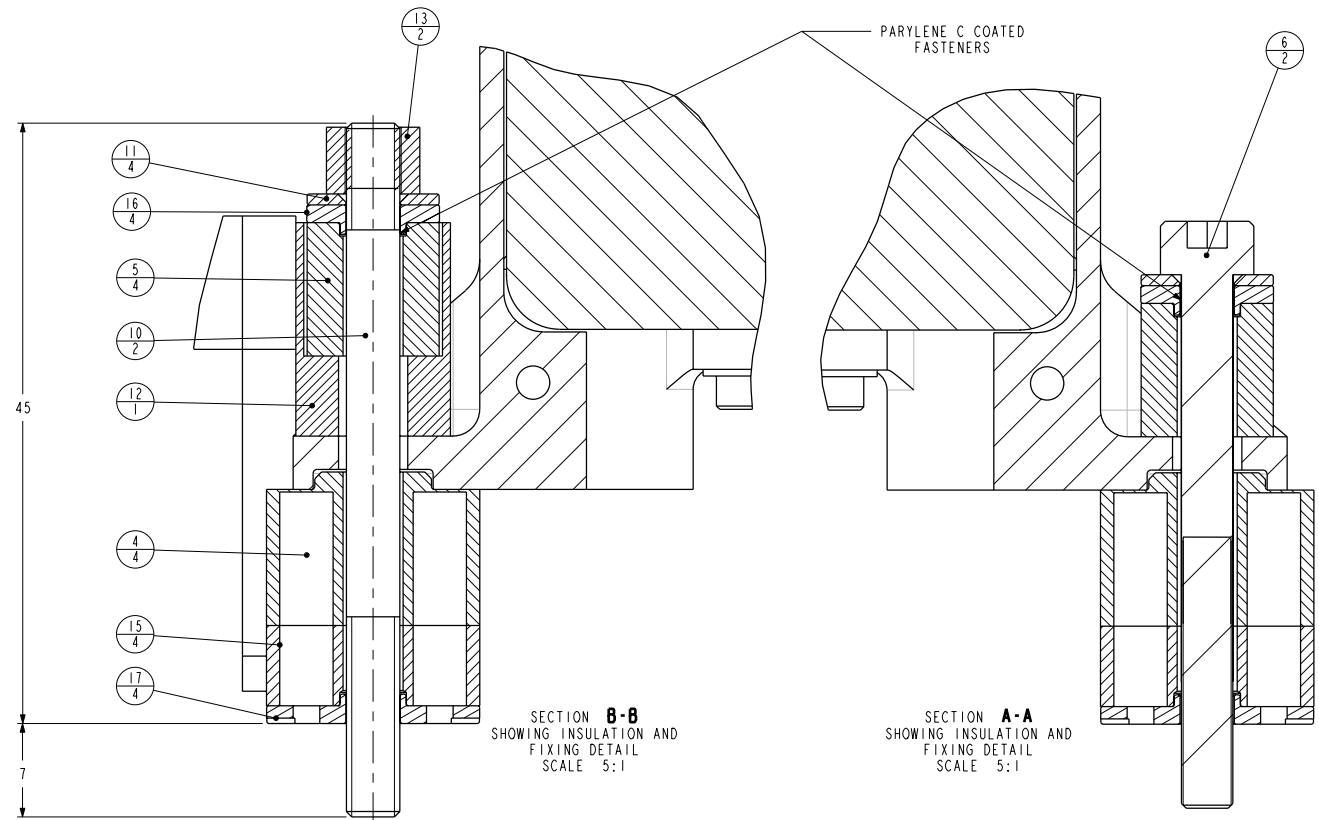
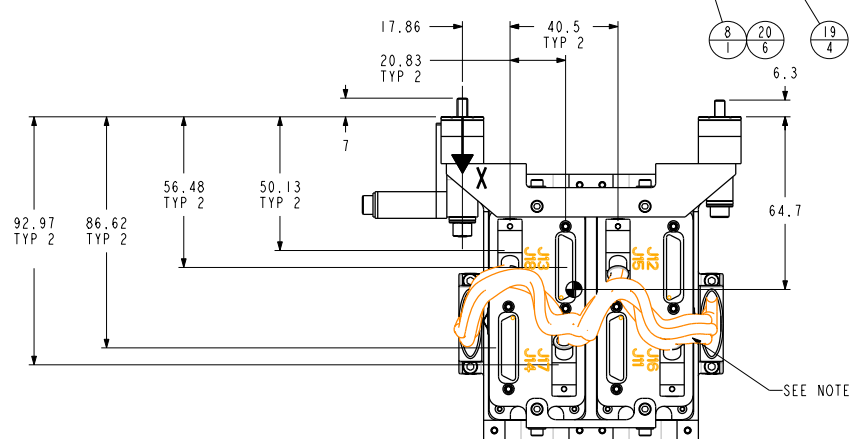
A 0-KE-0104-350-J



CONNECTOR TABLE		
LABEL	TYPE	FUNCTION
J1	ALL MDW2SP	ALL SIGNAL FEEDS TO CRYOHARNESS
J2		
J3		
J4		
J5		
J6		
J7		
J8		
J9	MDW37S	BIAS WIRES FROM CRYOHARNESS
J10	ALL MDW5SP	SIGNALS IN FROM DETECTORS
J11		
J12		
J13		
J14		
J15	ALL MDW5SP	BIAS FEEDS INTO MODULES
J16		
J17		
J18		

MOMENTS OF INERTIA (kg mm ²) WITH RESPECT TO C OF G	
I _{xx}	1.71e+03
I _{yy}	1.94e+03
I _{zz}	2.31e+03

ITEM	PART NO.	DESCRIPTION	QTY	MASS/ITEM	TOTAL MASS	COMMENTS
1	23836-10209722	JFET MODULE	2	260.00	520.00	JPL SUPPLY
2	2JFET_HARNESS	BACKHARNESS (10209784.1)	1	216.95	216.95	JPL SUPPLY
3	HARNESS_CLIP		2			
4	KE-0104-354	STEPPED THERMAL STANDOFF	4	1.70	6.80	
5	KE-0104-355	TOP THERMAL STANDOFF	4	0.87	3.47	
6	KE-0104-358	M4 BOLT (PARYLENE C COATED 26.5mm)	2	4.70	9.39	
7	KE-0104-361	FRONT PLATE - 2 JFET	1	48.01	48.01	
8	KE-0104-362	REAR FOOT BEAM - 2 JFET	1	33.69	33.69	
9	KE-0104-363	REAR TOP BEAM - 2 JFET	1	8.62	8.62	
10	KE-0104-365	M4 STUD (PARYLENE C COATED)	2	5.08	10.16	
11	KE-0104-367	THERMAL STANDOFF WASHER	4	0.39	1.55	
12	KE-0104-368	THERMAL STRAP ASSY - 2 JFET	1	23.28	23.28	
13	KE-0104-386	M4 NUT (5mm LONG)	2	1.31	2.62	
14	KE-0104-393	L3 INTERFACE ASSY	1	64.18	64.18	
15	KE-0104-397	THERMAL STANDOFF BUSH	4	0.94	3.76	
16	KE-0104-398	FOOT UPPER WASHER	4	0.14	0.55	
17	KE-0104-399	FOOT LOWER WASHER	4	0.34	1.35	
18	L3_STRAP_A	L3 STRAP	1	N/A		HERSCHEL SUPPLY
19	M2-5_WASHER	WASHER	8	0.11	0.86	S/STEEL BS970/1501 304S 11/15/31
20	M2-5_X_BLG_CPHD_SKT_SS	FASTENER	12	0.58	6.93	S/STEEL BS3506-1:1998 A2-70
21	M3_X_BLG_CPHD_SKT_SS	FASTENER	8	0.74	5.95	S/STEEL BS3506-1:1998 A2-70
				ASSEMBLY MASS	968.13 GRAMS	



- NOTES:-
- BOND ITEM 15 TO 4 PRIOR TO ASSEMBLY. BOND ITEMS 16 & 14 TO 3 PRIOR TO ASSEMBLY. ITEMS 3 & 4 TO BE PERMANENTLY GLUED TO MATING SURFACES.
 - TO ATTAIN THE CORRECT MOUNTING INTERFACE DIMENSION, AND TO COMPENSATE FOR ACTUAL JFET MODULE SIZES, THE FOLLOWING PROCEDURE MUST BE FOLLOWED: PARTS 1 ARE TO BE MOUNTED TO PART 6. MEASURE FROM THE TOP OF PARTS 1 SHOWN AS PLANE 'C' TO THE TAIL END FACE OF PARTS 6, NOTING THE TWO VALUES. MACHINE RAISED PADS ON PART 7 TO REMOVE (VALUE - 87.7). PADS ON ITEM 8 WILL ALSO NEED MACHINING IF TRIAL ASSEMBLY OF RACK ON FLAT SURFACE SHOWS GAPS BEFORE FASTENERS ARE TIGHTENED.
 - ITEMS 6 TO BE TORQUED TO 2.1 Nm ABOVE LOCKING INSERT RUNNING TORQUE. ITEMS 13 TO BE TORQUED TO 2.1 Nm WITH STUD SET TO DEPTH SHOWN IN HOB LOCKING INSERT.
 - UNIT SHOWN FITTED WITH BACK-HARNESS MATING TO J9 - J10 & J15 - J18 BECAUSE THIS WILL BE FITTED BEFORE ITEM IS INTEGRATED TO HOB.
 - HEAT CAPACITY AT RT = 700 JOULES / KELVIN.
 - FITTED BACKHARNESS TO AFFORD OPEN ACCESS TO 51 WAYS AS SHOWN.
 - AFFIX ONE SENSOR WITH LONG BOLTS AND THEN THE OTHER ON THE REVERSE WITH NUTS
 - ITEMS 6 AND 11 TO BE PRE-FITTED BEFORE ITEM 2 IS FITTED
 - ONLY 3mm JACKSCREW LENGTH GUARANTEED BELOW THE MATING PLANE
 - INNER SURFACES OF PARTS 4, 5 AND 15 TO BE CLEAN OF CARBON WHISKERS AND OVERCOATED WITH D222A AFTER ASSEMBLY.

A 0-KE-0104-360-L

ISSUE	DATE	MOD. No.	DRN. BY	CHKD.	APPD.	STATUS
L	05-Aug-05	KE-2952.	D. SMART			ISSUED
TOLERANCES UNLESS STATED		FINISH		ORIGINAL SCALE		
±0.2 mm		CLEAN		1:1		
±0.3		REMOVE ALL BURRS		DO NOT SCALE		
MATERIAL & SPEC.		SURFACE TEXTURE µm				
SEE DETAILS		UNLESS STATED				
USED ON						© CLRC 2005
CENTRAL LABORATORY OF THE RESEARCH COUNCILS						
TITLE						
2 JFET RACK						
INTERFACE DRAWING						
SPIRE						
A 0-KE-0104-360-L						1 OF 1