SPIRE

SUBJECT: **SPIRE PFM FPU Mass Properties Measurements Report**

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Change Record

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    1   28/9/06   New issue

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1. SCOPE

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

2. APPLICABLE DOCUMENTS

AD 1   SCI-PT-IIDB/SPIRE-02124   SPIRE IID-B

3. REFERENCE DOCUMENTS

4. BUILD STANDARD

For these measurements the following departure from full FM standard should be noted.

- Aperture cover fitted (red tag item)
- Test L0 straps fitted, similar in mass to FM but there are some differences.
- JFETS weighed separately.
- Harness to JFET integral to the FPU, but location not exactly as when attached to the JFETS.

5. MASS MEASUREMENTS

5.1 Procedure

The FPU was mounted on the HOB simulator plate for these measurements. (annex 1)
The mass of the FPU and the HOB plate was measured using two digital scales.
The mass of the HOB plate was calculated and subtracted from the total to give the mass of the FPU.

| Unit	Measured Mass	Nom Mass in IID-B	Allocated Mass
FPU + HOB	89.42		
Calculated mass of hob plate	43.90		
Mass of FPU	45.52	45.0	47.2
HSJFET, With L3 interface block		2.73	2.8
HPJFET, With L3 interface block		1.0	1.0
Total		**48.73**	**51.0**

6. CENTRE OF GRAVITY MEASUREMENTS

6.1 Procedure

Measurements were taken in Y and Z axis only.

The Combined HOB and FPU were balance on a circular bar on top of a surface table.
The point of balance was measure from the end of the HOB plate. Measurement accuracy is +/- 0.5mm.
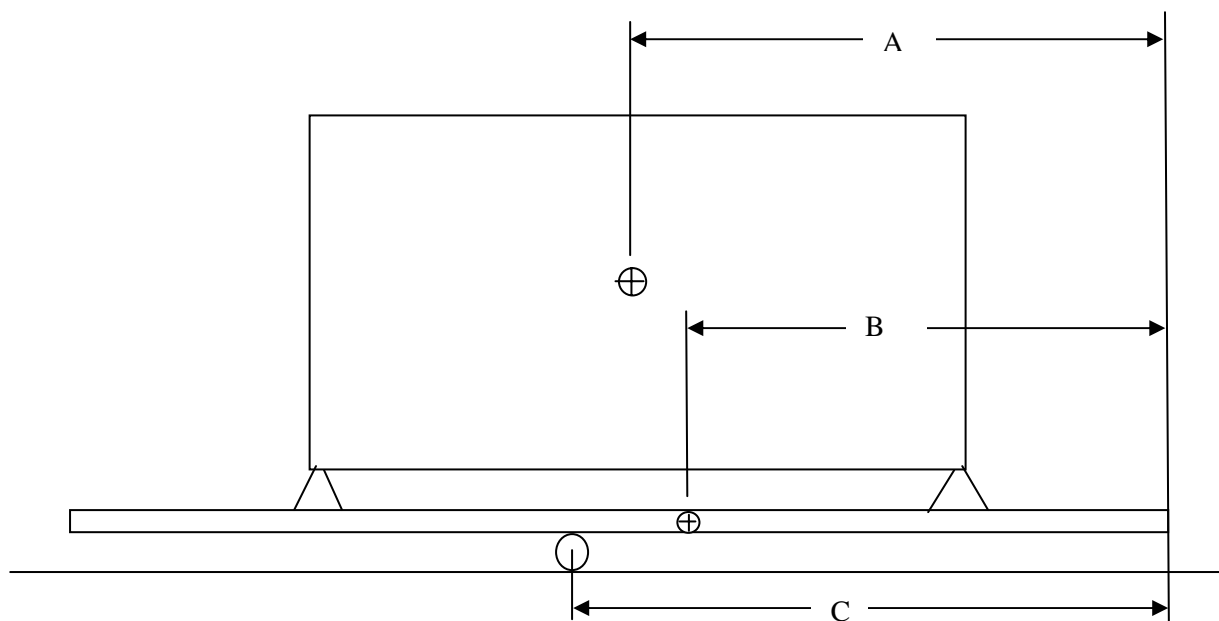
Arrangement is shown above.

Axis	A	B calculated	C measured
Z		480.5	515.75
Y		450	441

Z axis:

Mass of HOB x B + Mass of FPU x A = (mass of HOB + FPU) x C
43.9 x 480.5   + 45.52 x A   = 89.42 x 515.75
21093.95   + 45.52 x A   = 46118.37
                              A   = 25024.42/45.52

A   = 549.75

Position of C of G from cryostat ref   = 549.75 -120 = 429.75

Y axis:

Mass of HOB x B + Mass of FPU x A   = (mass of HOB + FPU) x C
43.9 x 450   + 45.52 x A   = 89.42 x 441
19755   + 45.52 x A   = 39434.2
                        A   = 19679.2/45.52
                A   = 432.3

Position of C of G from cryostat ref   = 531 - 432.3   = 98.68

6.2 Comparison with calculated C of G position on MICD.

Axis	Measured value from this test	Position on MICD	Difference
Z	429.75	430.55	0.8
Y	98.68	97.58	1.1

7. CONCLUSIONS

Comparing the measured test results with the positions of the C of G calculated from the CAD model and as indicated on the MICD, we have very close correlation, at least in two axis. This would indicate that the CAD model is a true representation of the mass properties and the following C of G positions and M of I values are valid.

7.1 C of G

AXIS	Position of C of G from cryostat reference axis (mm)	Method of assessment
X	220.88	calculated
Y	98.68	measured
Z	429.75	measured

7.2 M of I

AXIS	Moment of inertia (Kgm^2)	Method of assessment
X	3.056	calculated
Y	3.008	calculated
Z	1.559	calculated