SPIRE

SUBJECT: **SPIRE FPU Handling and Mechanical Integration Procedure**

PREPARED BY: **E Sawyer**

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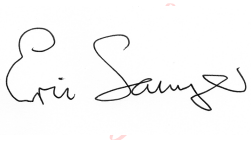

Digitally signed by Eric Sawyer
Date: 2007.01.29 13:35:45 Z

DOCUMENT No: **SPIRE-RAL-PRC-002802**

ISSUE: **1** **Date:** **17 January 2007**

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Digitally signed by Douglas Griffin
DN: cn=Douglas Griffin, o=RAL, ou=SET, c=GB
Date: 2007.01.30 12:10:08 Z

APPROVED BY:

Digitally signed by Eric Clark
Date: 2007.01.30 12:13:08 Z

Distribution

Change Record

ISSUE	DATE	
1	17/1/07	First issue

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Glossary

Cold Units	SPIRE FPU, JFP and JFS
CQM	Cold Qualification Model
DCU	Detector Control Unit
DPU	Digital Processing Unit
DRCU	SPIRE DCU and FCU, i.e the two units with interfaces with the SIH-SS
ESD	Electro static Discharge
FCU	Focal plane Control Unit
FPU	Focal Plane Unit
HOB	Herschel Optical Bench
JFP	Herschel Spire JFET Photometer Module
JFS	Herschel Spire JFET Spectrometer Module
JFET	Junction Field Effect Transistor
L0	Level 0 (Zero)
MSSL	Mullard Space Science Laboratory
OBA	Optical Bench Assembly
PFM	Proto Flight Model
RAL	Rutherford Appleton Laboratory
SIH-CS	Cryogenic Cryoharness between CVV-CB and Instrument
SIH-IS	Intermediate Cryoharness between CVV-CB and SVM-CB
SIH-SS	SVM Cryoharness between SVM-CB and DRCU
SPIRE	Spectral and Photometric Imaging REceiver
TBC	To Be Confirmed
Warm Units	SPIRE DPU, FCU and DCU
WIH	(SPIRE) Warm Interconnection Harness

References

Applicable Documents

AD1
AD 2
AD 3

Reference Documents

RD1 . "***Making SPIRE ESD Safe -*** SPIRE-RAL-NOT-002028

1. SCOPE

This document describes the procedures to be followed when handing the SPIRE FPU after delivery to ESA/Industry.
It covers the handling and integration procedures to be followed.
It covers the PFM only.

2. DELIVERY CONDITION

The SPIRE instrument is delivered in the following condition:-

The FPU is supplied in a dedicated, re-useable, container.
The container consists of an inner and outer box.
The inner box is mounted on shock attenuating mounts.
Alignment cube is fitted to the FPU. (red tag item). See section 8 for further details.
FPU aperture cover fitted (red tag item). See section 8 for further details.
Harnesses between the FPU and JFETs fitted.
FPU and JFETs attached to a baseplate.
The FPU is attached to the base plate using transit supports, these will be exchanged for the flight supports during the integration process.
Shorting plus or covers will be fitted to all electrical connectors See section 8 for further details.
FPU and JFETs double wrapped in dissipative film.
Witness mirrors and/or PFO plates will be fitted to the baseplate
Silica gel moisture control devices will not be used

2.1 Shock recorders

Attached to the inner box, inside the transportation container are re-settable shock indicators These operate in three axis and are set to 5,10 and 25g.
Upon inspection, if any of these recorders have triggered the project team at RAL should be informed.
'Tip and Tell' tilt sensors are attached to the outside of the FPU container.
Upon inspection, if any of these recorders have triggered the project team at RAL should be informed

3. TRANSPORT

3.1 In dedicated experiment containers

Protect from rain and moisture.
Transport in closed vehicles only.
Protect from extremes of temperature, -10°C to +50°C, and prevent the formation of dew at any time.

3.2 After integration on the spacecraft (in spacecraft container)

Equivalent to Cleanroom 100 conditions

Assuming that the cryostat is closed:
FPU Aperture cover (red-tag item) shall be removed
Alignment cube (red-tag item) shall be removed
No other specific requirement.
For transport the CVV is closed, evacuated, cooled, OBA in vertical position, z-axis downwards.

4. STORAGE

4.1 In dedicated experiment container

Ensure aperture cover (red-tag item) is fitted.
Protect from rain and moisture.
Protect from extremes of temperature, 10°C to +30°C.
Alignment cube is fitted.

4.2 Out of container (in RR100 cleanroom, awaiting integration)

Ensure aperture cover (red-tag item) is fitted.
Alignment cube is fitted

5. HANDLING

5.1 General.

The FPU is a delicate optical instrument and should be handled with extreme care at all time. Contamination of the optical surfaces within the instrument is prevented by the aperture cover. This cover should remain in place unless it is necessary to remove it.
WARNING: The bipod legs on two corners of the instrument are very thin section and easily damaged. Care must be taken at all times not to put side loads into these items. These are at risk at all times when the FPU is not attached to a rigid plate. When it is attached to a rigid plate i.e. the HOB or its transport plate then it is tolerant of loads from vibration, lateral expansion, thermal tests, etc.

5.2 ESD protection

The SPIRE instrument contains very sensitive detectors that are susceptible to damage by Electro Static Discharge. On delivery all connectors will be protected by covers or shorting plugs as appropriate. When handling, all personnel shall wear anti static protection (wrist straps or other suitable method) When the cryoharness is not connected to the DRCU and the FPU Faraday Shield Link connected to Backshell at the warm end, then the FPU is electrically floating and prone to ESD damage. To avoid this the FPU should at all time be connected to an electrical ground, when removed from its container and not bagged in dissipative film.

5.3 Unpacking from dedicated experiment container

The FPU is supplied attached to a baseplate together with the JFETs and the JFET harness already integrated. It is bagged in dissipative film.
This base plate is then covered by an inner container, which is mounted via shock attenuating mounts to the outer container base.
To remove the FPU and JFETs from the container, the following procedure should be followed: -

Outer container

Inner container

5.3.1 Removal from outer container:

Step	Description	Sign off	comments
1	This first stage can be carried out in a non clean area.		
2	Clean the outer surfaces of the outer container with a vacuum cleaner and an IPA wipe to remove the worst of the contamination accumulated during transit and storage.		
3	Undo the nine latches that secure the container lid and remove the lid.		
4	Attach a grounding strap to the instrument baseplate.		
5	Undo the 28, M8 bolts that secure the inner container to the secondary base plate.		
6	Clean the outer surfaces of the inner container with a vacuum cleaner and an IPA wipe.		
7	Attach the lifting MGSE to the 4 eye bolts on the base plate.		
8	Lift the inner container clear of the outer.		
9	Wipe the under surface of the inner container.		
10	The inner container can now be moved into a cleaner environment (class 100,000)		
11	Position the inner container on a convenient table for next phase.		

5.3.2 Removal from inner container:

Step	Description	Sign off	comments
1	Remove the 40 screws that attach the inner container lid to its base plate.		
2	Lift off the inner container lid		
3	The protective bagging encloses the FPU, JFETs and harness and is taped to the baseplate		
4	Remove the outer bagging material		
5	If required the instrument and baseplate can be moved to the class 100 clean area at this stage. If so attach the MGSE to the lifting eyes on the base plate		
6	If the instrument is already in the class 100 area it can now be uncovered by removing the inner bagging material.		
7	Shorting plugs on the JFP and JFS provide ESD protection at this stage.		

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5.4 Preparation for integration

The FPU is supplied with the JFETs and associated harness already fitted.
The following tasks need to be carried out before integration onto the spacecraft.
Only standard tools are required at this stage.

5.4.1 Fitting of MGSE and JFET supports

The JFETs will be fitted to the spacecraft together with the FPU. They will need supporting during this activity.
The SPIRE supplied MGSE provides provision to support the JFETS during integration.

Step	Description	Sign off	comments
1	Fit the lifting attachment to the FPU as shown in annex A.		
2	Attach the JFETS to the MGSE using lacing cord.		

5.4.2 Removal of detector L0 strap

Step	Description	Sign off	comments
1	This strap to be taken off before removal of the FPU from the base plate.		SPIRE activity
2	Remove the fasteners (six M4 screws) which attach the lower flexible to the pod interfaces.		SPIRE activity
3	Remove the spreader plate together with the temperature sensor.		SPIRE activity
4	Loosen and remove the two M4 fasteners that connect the strap to the detector box		SPIRE activity
5	Loosen and remove the 5 4-40 UNC fasteners that attach the Torlon supports to the FPU		SPIRE activity
6	Remove the strap assembly.		SPIRE activity
5	The FPU is electrically connected to the baseplate for ESD protection, this strap to be disconnected from the base plate and replaced with one connected to a secure ground connection.		

5.4.3 Removal from transit base plate

WARNING: The flight bipod legs on two corners of the instrument are very thin section and easily damaged. Care must be taken at all times not to put side loads into these items. These are at risk at all times when the FPU is not attached to a rigid plate.

Step	Description	Sign off	comments
1	Attach a ground strap directly to the FPU		
2	Undo the five M4 fasteners which secure the Photometer JFET rack (HSJP) (8 JFETs) to the baseplate. Leave the screws in position as they cannot be removed form the JFET rack.		
3	Undo the four M4 fasteners that secure the Spectrometer JFET rack (HSJS) (2 JFETs) to the baseplate. Note that two		

	of these fasteners are studs with nuts on the top, the nuts should be removed and the studs left in place.		
4	The two remaining L0 straps are also secured to the baseplate. To release these from the baseplate, undo the 4 off M4 fasteners on each strap and remove the fasteners. NOTE. The undersides of these straps form the thermal interface to the spacecraft helium tank pods. Their surfaces are flat and soft gold plated, these surfaces can easily be damaged and the thermal performance of the instrument may suffer as a result.		
5	Unbolt the cone from the FPU by undoing the M8 nut, thus leaving the cone on the baseplate.		
6	Undo and remove the 8 fasteners on the transit blade mounts that attach the FPU to the baseplate.		
7	The FPU and JFETs can now be lifted from the baseplate.		
8	While suspended from the crane, remove the transit blade mounts		
9	Fit the flight blade mounts.		To be carried out by SPIRE team.
10	Torque the screws to 8.1 Nm. +/- 10% above running torque		
11	The FPU and JFETs are now ready for integration.		

5.5 Packing in the dedicated experiment container

Step	Description	Sign off	comments
1	Assuming activities described in section 5.4 have been carried out, and the FPU and JFETs are supported on a crane,		
2	The Spectrometer JFET studs (2 off) as indicated on interface drawing 0-KE-0104-360. Should still be fitted to the baseplate		
3	Lift the FPU and JFETs using the lifting gear as described in section 6.		
4	Remove the Flight blade mounts if fitted		
5	Fit the transit blade mounts		
6	Very gently lower the assembly onto the baseplate, ensuring that the JFET studs engage on the JFETs and the cone mount engages in its location on the FPU.		
7	When all units are resting on the baseplate, fit the attachment screws (M6X21) to the bipod feet, torque the screws to 8.1 Nm. +/- 10% above running torque.		
8	Fit the M8 nut and Belleville washer to the mounting cone. Torque to 8.25 Nm. +/- 10% above running torque.		
9	Remove the lifting/handling fixture.		
10	Fit the two long bolts and two nuts to secure the spectrometer JFET. Torque the screws to 2.1 Nm. +/- 10% above running torque.		
11	Fit the 5 long bolts to secure the photometer JFET. Torque		

	the screws to 2.1 Nm. +/- 10% above running torque.		
12	Secure the L0 straps to the baseplate using M4X20 socket head cap screws. Torque the screws to 1.5 Nm. +/- 10% above running torque.		
13	Fit the electrical grounding strap between the FPU and the baseplate.		
14	Cover the FPU and JFETs with a double layer of clean lumaloy film and secure each one with tape to the baseplate.		
15	Fit the inner container lid and secure with the 40 fasteners supplied		
16	Fit the lifting frame Ref MSSL/5264/404 to the four eyebolts in the plate.		
17	Lift the plate into the base of the outer container.		
18	Attach with the 28 fasteners provided		
19	Check the shock monitors and reset if necessary		
20	Fit the outer lid and secure with the 9 catches.		

6. INTEGRATION

6.1 Required tools/MGSE

SPIRE supplied tools/MGSE:-

FPU and JFET handling frame.
FPU/JFET/baseplate lifting gear
JFET fixation hardware
Isolation washers, special screws and studs
L3 pressure plates 2-off
L1 strap screws M8 2off, M3 4off (these screws will be prepared for wire locking)
Wire for locking above screws.
L1 bushes for the vent line end (already supplied)
Temporary FPU Grounding Strap including M4 x 6mm fastener to connect to OBA
NOTE, Could possibly be attached to the unused harness support bracket holes, or any other convenient tapped hole.

Supplied by spacecraft

Crane, with low speed capability
Fixation bolts,
FPU M6 12 off -
L0 straps M4 16 off -
L0 pressure plate 4 off
L3 strap M4 4off
Torque wrench to cover 1.5 to 8.25 Nm
Allan key, spanners etc
DVM for electrical isolation testing

6.2 Mechanical integration to spacecraft

6.2.1 FPU and JFETs

Assuming activities described in section 5.4 have been carried out, and the FPU and JFETs are supported on a crane.

Step	Description	Sign off	comments
1	Fix the Spectrometer JFET studs (2 off) as indicated on interface drawing 0-KE-0104-360. Note these should be screwed into the HOB until 45mm of stud are protruding from the surface.		
2	Fit the flight cone to the spacecraft OBA. Note: there are special washers (part number A3/5264/302-3) under the head of each screw and also Vespel insulating bushes (A3/5264/302-2) either side of the mounting flange.		
3	Lift the FPU and JFETs using the lifting gear as described in section 6.		
4	Very gently lower the assembly onto the HOB, ensuring that the JFET studs engage on the JFETs and the cone mount engages in its location on the FPU.		
5	The flexible ends of the L0 straps are unsupported at this stage and will need to be guided by hand into place as the FPU is lowered		
6	NOTE: the cone is very thin walled section and large moments can be applied if the FPU is not lowered with its interface plane parallel to the HOB		
7	When all units are resting on the HOB, fit the attachment screws (M6X21) to the bipod feet as for the cone mount.		
8	Fit the two Bellville washers and the M8 Kaylock nut to the cone mount. Torque to 8.25Nm.		
9	Remove the lifting/handling fixture.		

6.2.2 L0 straps

6.2.2.1 The cooler pump and evaporator straps

Step	Description	Sign off	comments
1	These will be in place at this stage.		
2	Ensure that the lower flexibles of these two straps align with the pod interfaces. Fit the spreader plates together with their temperature sensors. Fit the attachment screws (ten M4 For the evaporator strap, six M4 screws for the pump		
3	Torque to specification defined by Astrium		

6.2.2.2 Detector strap

Step	Description	Sign off	comments
1	Offer up the strap assembly to the FPU and fit the two M4 screws that attach the strap to the FPU cold interface, detector		SPIRE activity
3	Torque the attachment screws 2.2 Nm +/- 10% above running torque		SPIRE activity
4	Attach the torlon frames with the 5 off 4-40 UNC screws previously removed.		SPIRE activity
5	Torque the screws to 0.76 Nm +/- 10% above running torque		SPIRE activity
7	Ensure that the lower flexibles align with the pod interface. Fit the spreader plate and temperature sensor with the six M4 attachment screws .		
8	Torque in accordance with Astrium specification.		

6.2.3 L1 straps.

Step	Description	Sign off	comments
1	Fit the two L1 straps to the FPU as indicated in annex C, using at each location, one insulating bush, one Bellville washer type B0750-056-S and one M8 bolt		
2	Torque the M8 bolt to 10.5 Nm +/- 10% above running torque		
3	Fit the two M4 bolts with isolating bushes and two Bellville washers (type B0375-020-S) under each screw head		
4	Torque the M4 bolts to 1.5 Nm +/- 10% above running torque		
5	On final assembly the M8 fasteners are to be wire locked to the M4 fasteners. Screws will be prepared for wire locking		

6.2.4 L3 straps.

Step	Description	Sign off	comments
1	Fit the two L3 straps to the JFETs using the attachment hardware (L3 thermal strap clamp provided by SPIRE) as shown in interface drawings 0-KE-0104-350 and 0-KE-0104-360, annex 3		
2	Torque to 2.5 Nm.		
3	Note. Spacecraft temperature sensors, two sensors on each clamp, fit to this interface.		

6.2.5 Isolation test

This test is to be carried out with a witness from the SPIRE project team. The removal of the safeing plugs from the JFET units places the instrument in a state where it is more susceptible to ESD damage. The process is to be carried out with particular attention to safe ESD procedures, including the use of ionized air flow over the connectors during mating/demating operations.

Step	Description	Sign off	comments
1.	Remove the temporary earth strap between the FPU and the cryostat		
	FPU/OBA Isolation		
2.	Measure and record the electrical isolation between the chassis of the FPU and the cryostat. Pass criteria is >= 1 MΩ isolation.		
3.	Remove the safeing plugs form JFP J25, J26, J27 and J28 while maintaining ionized air flow over the unit.		
4.	Cover JFP J25, J26, J27 and J28 with black, dissipative dust covers.		
5.	Remove the safeing plugs from JFS J09 and J10 while maintaining ionized air flow over the unit.		
6.	Cover JFS J09 and J10 with black, dissipative dust covers.		
	Spect. Det. Box / OBA Isolation		
7.	Measure the isolation between the OBA and the Detector Boxes Thermal Strap (on the instrument side of the electrical isolation joint). Pass criteria is >= 1MOhm		
	Phot. Det. Box / OBA Isolation		
8.	Measure the isolation between the OBA and the Evaporator Thermal Strap (on the instrument side of the electrical isolation joint). Pass criteria is >= 1MOhm		
	Spect. Det. Box / FPU Isolation		
9.	Measure the isolation between the FPU and the Detector Boxes Thermal Strap (on the instrument side of the electrical isolation joint). Pass criteria is >= 1MOhm		
	Phot. Det. Box / FPU Isolation		
10.	Measure the isolation between the FPU and the Evaporator Thermal Strap (on the instrument side of the electrical isolation joint). Pass criteria is >= 1MOhm		
	Phot. Det. Box / Spect. Det. Box Isolation		
11.	Measure the isolation between the Detector Boxes Thermal Strap and the Evaporator Thermal Strap (both on the instrument side of the electrical isolation joints). Pass criteria is >= 1MOhm		
12.	Fix the temporary grounding strap from the FPU to the OBA		
13.	Repeat the measurement of the resistance between the cryostat and the FPU to ensure that grounding has been successful, reading should be less than 3Ω		

6.3 Removal from spacecraft

6.3.1 L3 straps.

Step	Description	Sign off	comments
1	Note. Spacecraft temperature sensors, two sensors on each clamp, fit to this interface.		
2	Loosen and remove the two M4 fasteners attaching the clamp block and L3 strap to the JFETS		
3	L3 thermal strap clamp is provided by SPIRE and should remain with the instrument		
4	Remove the two L3 straps from the JFETs		

6.3.2 L1 straps.

Step	Description	Sign off	comments
1	Remove the wire locking from the two M8 fasteners and the four M4 fasteners.		
2	Loosen the two M8 and four M4 fasteners		
3	Remove the fasteners		
4	Retract the L1 straps from the FPU.		
5	Keep the fasteners and insulating bushes with the FPU		

6.3.3 L0 straps

6.3.3.1 The cooler pump and evaporator straps

Step	Description	Sign off	comments
1	These straps to be left attached to the FPU		
2	Remove the fasteners (ten M4 For the evaporator strap, six M4 screws for the pump) which attach the lower flexibles to the pod interfaces.		
3	Remove the spreader plates together with their temperature sensors.		
4	These spreaders and sensors are spacecraft supplied		

6.3.3.2 Detector strap

Step	Description	Sign off	comments
1	This strap to be removed before deintegration of the FPU		SPIRE activity
2	Remove the fasteners (six M4 screws) which attach the lower flexible to the pod interfaces.		SPIRE activity
3	Remove the spreader plate together with the temperature sensor.		SPIRE activity
4	Loosen and remove the two M4 fasteners that connect the strap to the detector box		SPIRE activity
5	Loosen and remove the 5 4-40 UNC fasteners that attach the Torlon supports to the FPU		SPIRE activity
6	Remove the strap assembly.		SPIRE activity

6.3.3.3 FPU and JFETs

Step	Description	Sign off	comments
1	Remove all electrical connections, see section separate procedure		
2	Unbolt the cone from the FPU by undoing the M8 nut, thus leaving the cone on the OBA		
3	Undo the five M4 fasteners which secure the Photometer JFET rack (HSJFP) to the HOB.		
4	Undo the four M4 fasteners that secure the Spectrometer JFET rack (HSJFS)to the HOB. Note that two of these fasteners are studs with nuts on the top.		
5	Undo and remove the 8 fasteners that attach the FPU to the OBA, 4 on each bipod.		
6	The FPU and JFETs can now be lifted from the HOB		

7. RED TAG ITEMS

The following red tag items are fitted to the FPU when delivered.

1. An aperture cover – To be removed at the latest opportunity prior to closure of the cryostat taking into account the possibility that the cover may not be able to be removed once the Instrument Shield is integrated.

2. Alignment cube – To be removed after alignment activities has ended and prior to closure of the cryostat taking into account the possibility that the cover may not be able to be removed once the Instrument Shield is integrated.

3. Temporary grounding strap – Removed during the Cryoharness Integration Procedure. (must be removed prior to integration of Instrument Shield)

4. Shorting plugs – Removed during the Cryoharness Integration Procedure.

When removed all red tag items shall be bagged and stored in the dedicated “red tag box”.

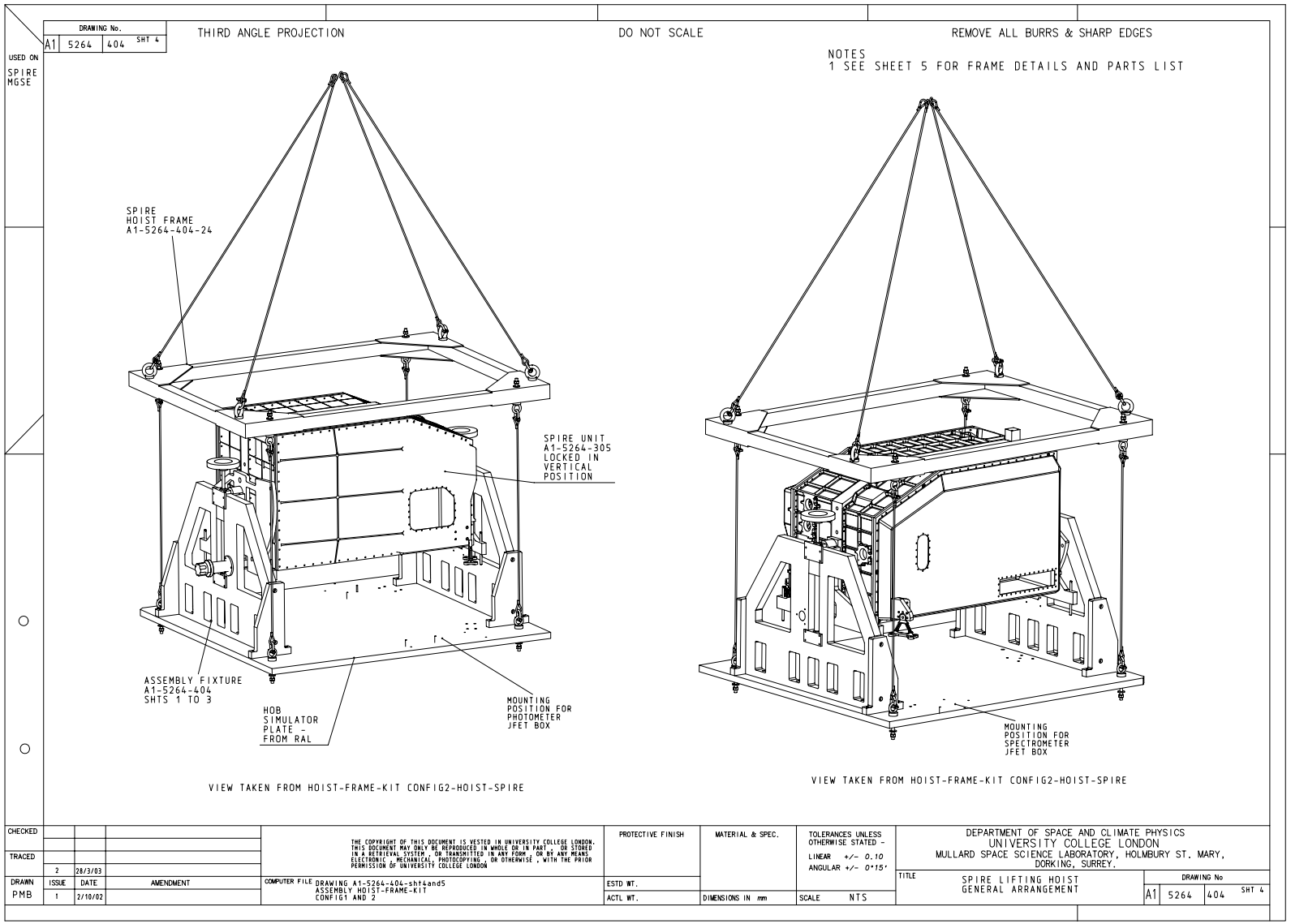
The aperture cover is removed by unscrewing the four 2-56 UNC (imperial) cap head screws, which are captive in the cover, and lifting the cover clear.

The alignment cube is removed by unscrewing the three fixing screws and lifting clear.

8. GREEN TAG ITEMS

There are no green tag items

ANNEX A - DRAWINGS OF SPIRE FPU MGSE


DRAWING No. A1 5264 404 SHT 4
THIRD ANGLE PROJECTION
DO NOT SCALE
REMOVE ALL BURRS & SHARP EDGES
USED ON SPIRE MGSE
NOTES
1 SEE SHEET 5 FOR FRAME DETAILS AND PARTS LIST
SPIRE HOIST FRAME A1-5264-404-24
SPIRE UNIT A1-5264-305 LOCKED IN VERTICAL POSITION
ASSEMBLY FIXTURE A1-5264-404 SHTS 1 TO 3
HOB SIMULATOR PLATE - FROM RAL
MOUNTING POSITION FOR PHOTOMETER JFET BOX
VIEW TAKEN FROM HOIST-FRAME-KIT CONFIG2-HOIST-SPIRE
MOUNTING POSITION FOR SPECTROMETER JFET BOX
VIEW TAKEN FROM HOIST-FRAME-KIT CONFIG2-HOIST-SPIRE
CHECKED
TRACED
DRAWN PMB
ISSUE 2 1
DATE 28/3/03 2/10/02
AMENDMENT
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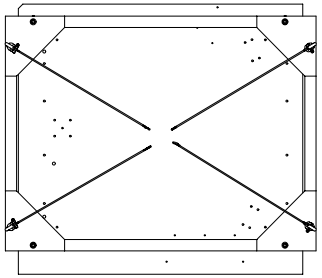
COMPUTER FILE DRAWING A1-5264-404-sht1and5 ASSEMBLY HOIST-FRAME-KIT CONFIG1 AND 2
PROTECTIVE FINISH
ESTD WT.
ACTL WT.
MATERIAL & SPEC.
DIMENSIONS IN mm
TOLERANCES UNLESS OTHERWISE STATED - LINEAR +/- 0.10 ANGULAR +/- 0°15'
SCALE NTS
DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.
TITLE SPIRE LIFTING HOIST GENERAL ARRANGEMENT
DRAWING No A1 5264 404 SHT 4

DRAWING No. A1 5264 404 SHT 5

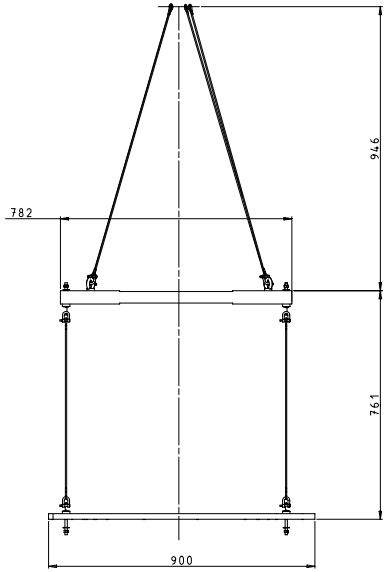
THIRD ANGLE PROJECTION | DO NOT SCALE | REMOVE ALL BURRS & SHARP EDGES

USED ON SPIRE MGSE

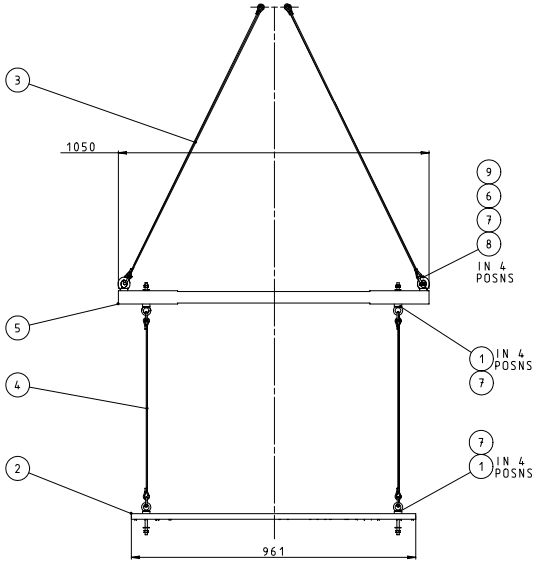
NOTES
1 SEE SHEET 1 FOR PICTORIAL VIEWS WITH SPIRE AND THE MGSE FITTED
2 ANGLES QUOTED ARE APPROXIMATE



VIEW TAKEN FROM HOIST-FRAME-KIT CONFIG1-HOIST-FRAME



VIEW TAKEN FROM HOIST-FRAME-KIT CONFIG2-HOIST-FRAME



VIEW TAKEN FROM HOIST-FRAME-KIT CONFIG1-HOIST-FRAME

ITEM No	DRAWING No	DESCRIPTION	QTY	REMARKS
9		WASHER M10	4	
8		EYEBOLT (SHOULDER) M10	4	ANGLIA HANDLING (ST STL)
7	927A078N	SHACKLE STANDARD	12	KEY INDUSTRIAL
6		NUT M10 HEX	4	ST STL
5	A1-5264-404-24	HOIST FRAME	1	
4	A3-5264-404-21	HOIST CABLE SHORT	4	
3	A3-5264-404-22	HOIST CABLE LONG	4	
2	REF	HOB SIMULATOR PLATE	1	
1	947A078N	EYEBOLT M8	8	KEY INDUSTRIAL

CHECKED			
TRACED			
DRAWN PMB	2	28/3/03	
	1	2/10/02	

ISSUE | DATE | AMENDMENT

COMPUTER FILE DRAWING A1-5264-404-sht14and5 ASSEMBLY HOIST-FRAME-KIT CONFIG1 AND 2

PROTECTIVE FINISH | ESTD WT. | ACTL WT.

MATERIAL & SPEC. | DIMENSIONS IN mm

TOLERANCES UNLESS OTHERWISE STATED –
LINEAR +/- 0.10
ANGULAR +/- 0°15'
SCALE NTS

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TITLE SPIRE LIFTING HOIST GENERAL ARRANGEMENT

DRAWING No A1 5264 404 SHT 5

DRAWING No.			
A1	5264	404	SHT 6 OF 7

THIRD ANGLE PROJECTION

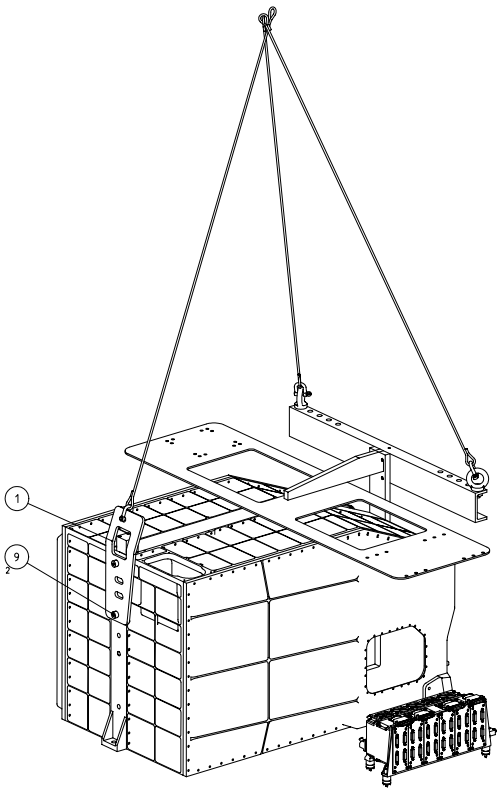
DO NOT SCALE

REMOVE ALL BURRS & SHARP EDGES

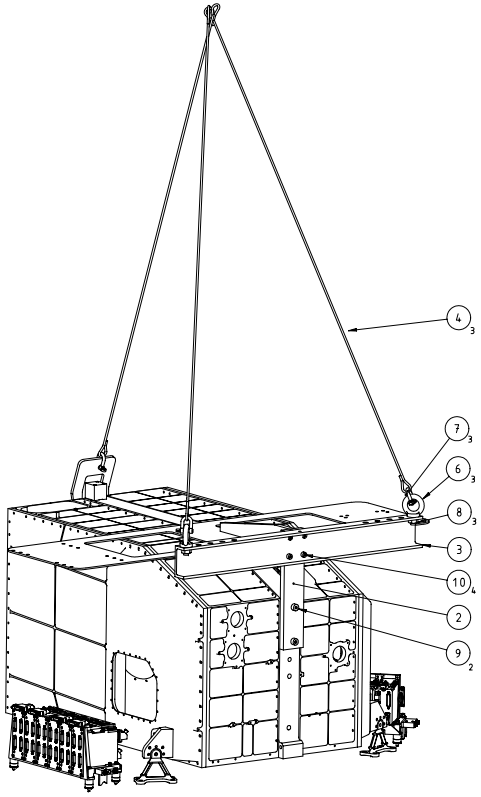
USED ON SPIRE MGSE

NOTES
1 DIMENSIONS ARE NOMINAL AND MAY VARY DUE TO MANUFACTURING TOLERANCES

NOTE
1 SEE SHEET 7 FOR SPIRE INSTALLATION LIFTING REFERENCE DIMENSIONS



VIEW SCALE 0.25 : 1



VIEW SCALE 0.25 : 1

ITEM No	DRAWING No	DESCRIPTION	QTY	REMARKS
10		SCREW M6x20 L SKT CAP HD	4	ST STEEL
9		SCREW M8X25 L SKT CAP HD	4	ST STEEL
8		M10 NUT HEX FULL	2	ST STEEL
7	927A078N	SHACKLE	3	KEY INDUSTIAL LTD
6		SHOULDER EYEBOLT M10	2	ANGLIA HANDLING
5				
4	A3-5264-404-22	HOIST CABLE	3	
3	A3-5264-404-16	REAR LIFT CHANNEL	1	
2	A3-5264-404-15	REAR LIFT PLATE	1	
1	A2-5264-404-34	FRONT LIFT BRACKET	1	

CHECKED	5	2/2/04	SUPPORT PLATE FOR 'JFET BOXES ADDED
	4	28/1/04	ASSEMBLY JIG PARTS REMOVED DUE TO SPACE LIMITATIONS
TRACED	3	8/8/03	FRONT LIFT BRACKET REPLACED WITH FRONT LIFT STRAP
	2	28/3/03	
DRAWN	ISSUE	DATE	AMENDMENT
PMB	1	2/10/02	

COMPUTER FILE
SPIRE-LIFT (ASSEMBLY)
CONFIG1-SPIRE-LIFT
A1-5264-404-SHT 6 and 7 (dwg)

PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
		LINEAR +/- 0.10
ESTD WT.		ANGULAR +/- 0°15'
ACTL WT.	DIMENSIONS IN mm	SCALE SEE VIEWS

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE: SPIRE LIFTING FOR INSTALLATION

DRAWING No: A1 5264 404 SHT 6 OF 7

DRAWING No.			
A1	5264	404	SHT 7 OF 7

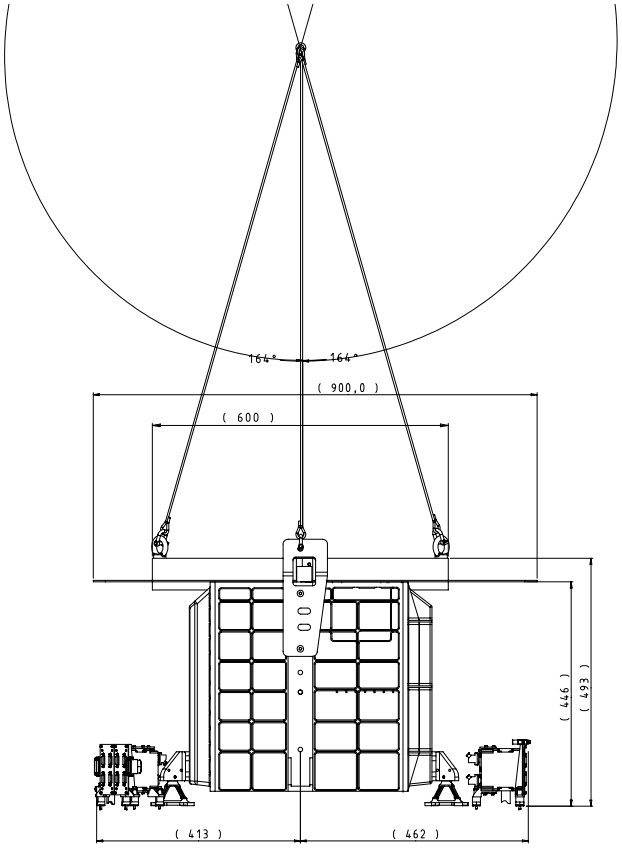
THIRD ANGLE PROJECTION

DO NOT SCALE

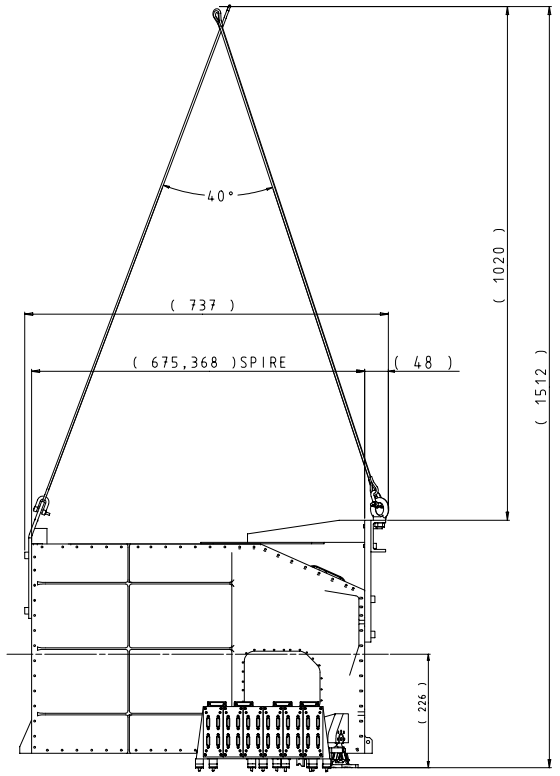
REMOVE ALL BURRS & SHARP EDGES

USED ON SPIRE MGSE

NOTES
1 DIMENSIONS ARE NOMINAL AND MAY VARY DUE TO MANUFACTURING TOLERANCES



VIEW SCALE 0.25:1



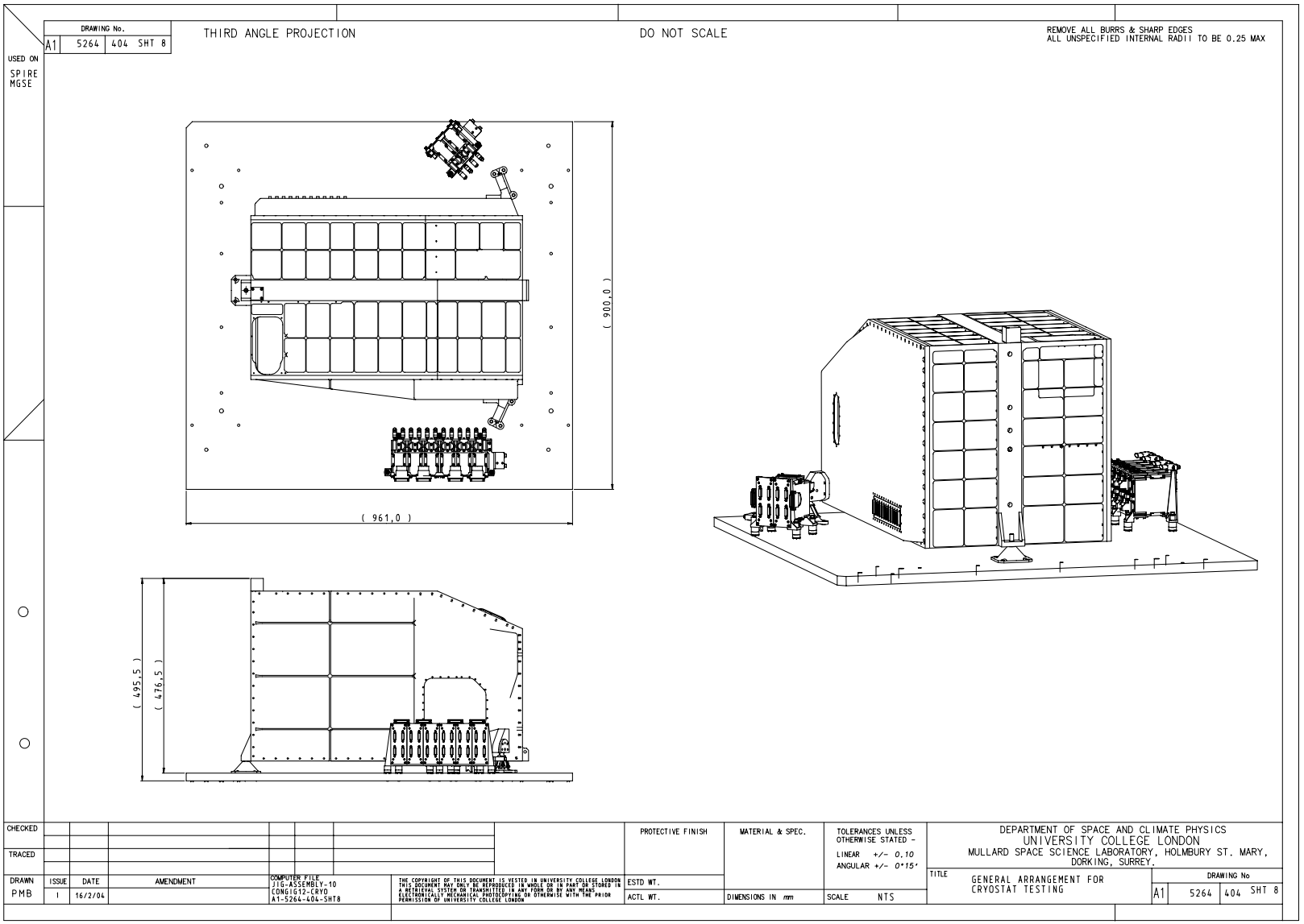
VIEW SCALE 0.25:1

CHECKED	5	2/2/04	SUPPORT PLATE FOR JFET BOXES ADDED				
	4	28/1/04	ASSEMBLY JIG PARTS REMOVED DUE TO SPACE LIMITATIONS				
TRACED	3	8/8/03	FRONT LIFT BRACKET REPLACED WITH FRONT LIFT STRAP				
	2	28/3/03					
DRAWN	ISSUE	DATE	AMENDMENT	COMPUTER FILE	PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
PMB	1	2/10/02		SPIRE-LIFT (ASSEMBLY) CONFIG1-SPIRE-LIFT A1-5264-404-SHT 6 and 7 (dwg)	ESTD WT.		LINEAR +/- 0.10
					ACTL WT.	DIMENSIONS IN mm	ANGULAR +/- 0°15'
							SCALE SEE VIEWS

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE: SPIRE LIFTING FOR INSTALLATION

DRAWING No: A1 5264 404 SHT 7 OF 7


DRAWING No.
A1 5264 404 SHT 8
THIRD ANGLE PROJECTION
DO NOT SCALE
REMOVE ALL BURRS & SHARP EDGES
ALL UNSPECIFIED INTERNAL RADII TO BE 0.25 MAX
USED ON
SPIRE
MGSE
(900,0)
(961,0)
(495,5)
(476,5)
CHECKED
TRACED
DRAWN
PMB
ISSUE
1
DATE
16/2/04
AMENDMENT
COMPUTER FILE
JIG-ASSEMBLY-10
CONG1612-CRYO
A1-5264-404-SHT8
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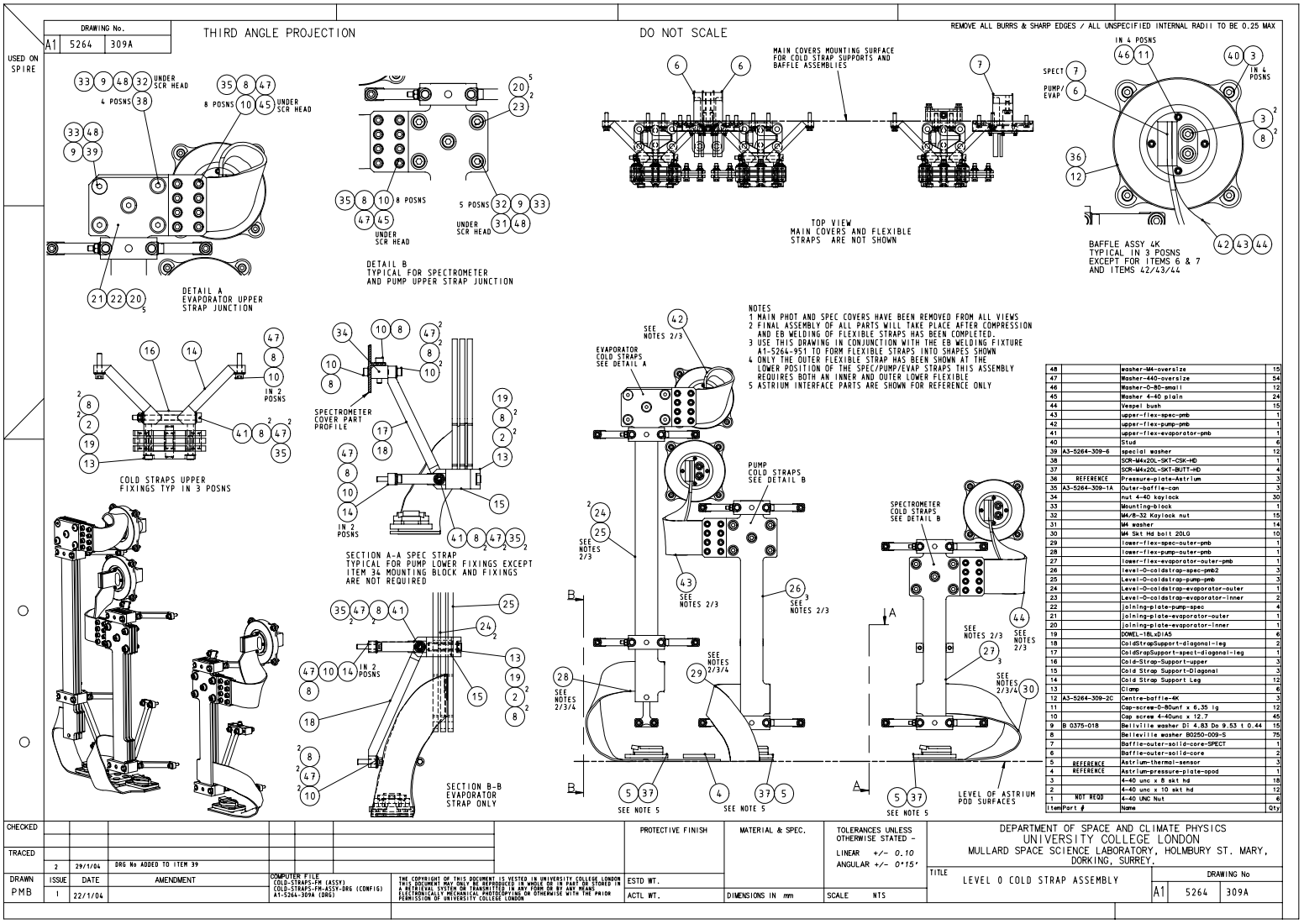
PERMISSION OF UNIVERSITY COLLEGE LONDON
PROTECTIVE FINISH
ESTD WT.
ACTL WT.
MATERIAL & SPEC.
DIMENSIONS IN mm
TOLERANCES UNLESS
OTHERWISE STATED -
LINEAR +/- 0.10
ANGULAR +/- 0°15'
SCALE NTS
DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY,
DORKING, SURREY.
TITLE
GENERAL ARRANGEMENT FOR
CRYOSTAT TESTING
DRAWING No
A1 5264 404 SHT 8

ANNEX B - L0 THERMAL STRAP ASSEMBLY



Item	Part #	Name	Qty
48		washer-M4-oversize	15
47		Washer-440-oversize	54
46		Washer-0-80-small	12
45		Washer 4-40 plain	24
44		Vespel bush	15
43		upper-flex-spec-pmb	1
42		upper-flex-pump-pmb	1
41		upper-flex-evaporator-pmb	1
40		Stud	6
39	A3-5264-309-6	special washer	12
38		SCR-M4x20L-SKT-CSK-HD	1
37		SCR-M4x20L-SKT-BUTT-HD	4
36	REFERENCE	Pressure-plate-Astrium	3
35	A3-5264-309-1A	Outer-baffle-can	3
34		nut 4-40 keylock	30
33		Mounting-block	1
32		M4/8-32 Keylock nut	15
31		M4 washer	14
30		M4 Skt Hd bolt 20LG	10
29		lower-flex-spec-outer-pmb	1
28		lower-flex-pump-outer-pmb	1
27		lower-flex-evaporator-outer-pmb	1
26		level-0-coldstrap-spec-pmb2	3
25		Level-0-coldstrap-pump-pmb	3
24		Level-0-coldstrap-evaporator-outer	1
23		Level-0-coldstrap-evaporator-inner	2
22		joining-plate-pump-spec	4
21		joining-plate-evaporator-outer	1
20		joining-plate-evaporator-inner	1
19		DOWEL-1BLxDIA5	6
18		ColdStrapSupport-diagonal-leg	2
17		ColdStrapSupport-spect-diagonal-leg	1
16		Cold-Strap-Support-upper	3
15		Cold Strap Support-Diagonal	3
14		Cold Strap Support Leg	12
13		Clamp	6
12	A3-5264-309-2C	Centre-baffle-4K	3
11		Cap-screw-0-80unf x 6.35 lg	12
10		Cap screw 4-40unc x 12.7	45
9	B 0375-018	Belleville washer Di 4.83 Do 9.53 t 0.44	15
8		Belleville washer B0250-009-S	75
7		Baffle-outer-solid-core-SPECT	1
6		Baffle-outer-solid-core	2
5	REFERENCE	Astrium-thermal-sensor	3
4	REFERENCE	Astrium-pressure-plate-opod	1
3		4-40 unc x 8 skt hd	18
2		4-40 unc x 10 skt hd	12
1	NOT REQD	4-40 UNC Nut	6

ANNEX C FPU INTERFACE DRAWING

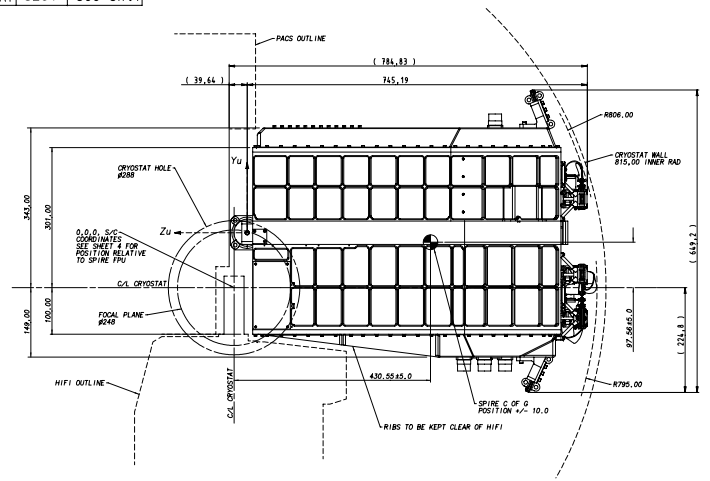
DRAWING No.		
A1	5264	300 sht1

THIRD ANGLE PROJECTION

DO NOT SCALE

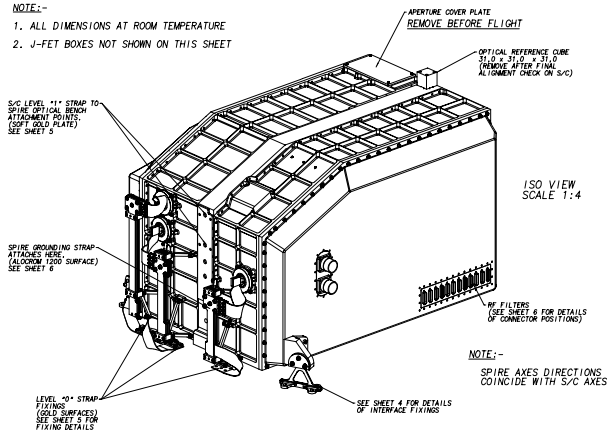
REMOVE ALL BURRS & SHARP EDGES

USED ON HERSCHEL



NOTE:-

1. ALL DIMENSIONS AT ROOM TEMPERATURE
2. J-FET BOXES NOT SHOWN ON THIS SHEET



ISO VIEW
SCALE 1:4

NOTE:-

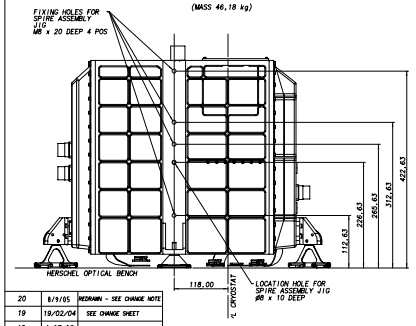
SPIRE AXES DIRECTIONS
COINCIDE WITH S/C AXES

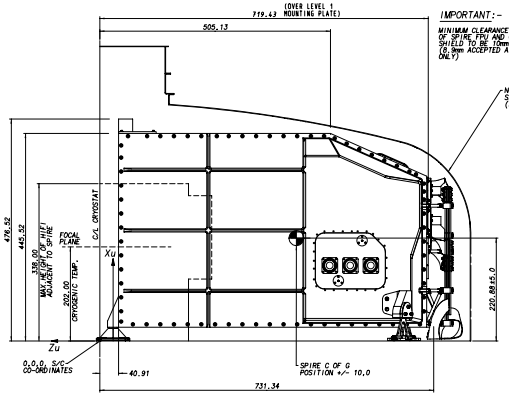
MOMENTS OF INERTIA ABOUT CG:-

(NOTE:- ALL MASS PROPERTIES EXCLUDE JFETS, EXTERNAL FPU HARNESSES AND ASTRIUM SUPPLIED LEVEL "0" INTERFACE PARTS)

Ixx = 3.056 kg m^2
Iyy = 3.008 kg m^2
Izz = 1.559 kg m^2

(MASS 46.18 kg)

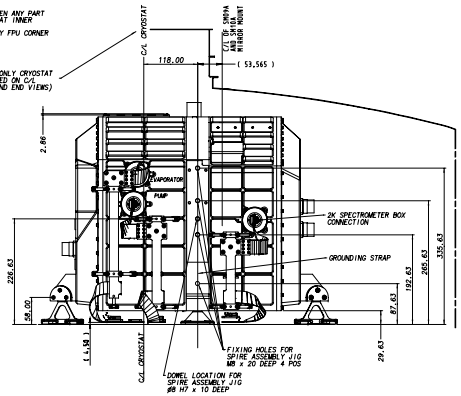




IMPORTANT:-

MINIMUM CLEARANCE BETWEEN ANY PART OF SPIRE FPU AND CRYOSTAT INNER SHIELD TO BE 10mm (6,9mm ACCEPTED AT -Z/+Y FPU CORNER ONLY)

NOTE:- ONLY CRYOSTAT SECTIONED ON C/L (SIDE AND END VIEWS)



	20	8/9/05	REDRAWN - SEE CHANGE NOTE	
	19	19/02/04	SEE CHANGE SHEET	
	18	4/07/03	SEE CHANGE SHEET	
	17	16/10/02	SEE CHANGE SHEET	
CHECKED	16	28/08/02	MODIFICATIONS AND CHANGE SHEET CREATED DRAWING UPDATED TO ISSUE 16 THERE-ON	NOTE:- SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS
	15	27/04/01	THERMAL STRAP INTERFACE MODIFIED. LEVEL 1 STRAP FIXING HOLES MOVED	
TRACED PGC	14	23/11/01	DEPTH OF GRAVITY ADDED TO SHT.1. J-FET DESIGN UPDATED, STAY OUT HOLES REMOVED.	
	13	19/11/01	UPDATED RF FILTER & PHOT CONNECTORS ADDED. FOCAL PLANE & "A" FRAME MOUNT DIM ADDED, SHEET 7 ADDED	
DRAWN AJC	ISSUE	DATE	AMENDMENT	SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)
	1	24/11/01		COMPUTER FILE

PROTECTIVE FINISH ALODRON 1200 AL PARTS GOLD PLATED AREAS ON COPPER PARTS (ST.STEEL PARTS NATURAL)	MATERIAL & SPEC. AS LISTED	TOLERANCES UNLESS OTHERWISE STATED - LINEAR +/- 0.10 ANGULAR +/- 0°15'
ESTD WT. 45,63kg (NO CONT) SEE NOTE SHT.1		
ACTL WT.	DIMENSIONS IN mm	SCALE 1:4

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY,
DORKING, SURREY.

TITLE	DRAWING No
SPIRE INTERFACE (GENERAL DIMENSIONS)	A1 5264 300 sht1

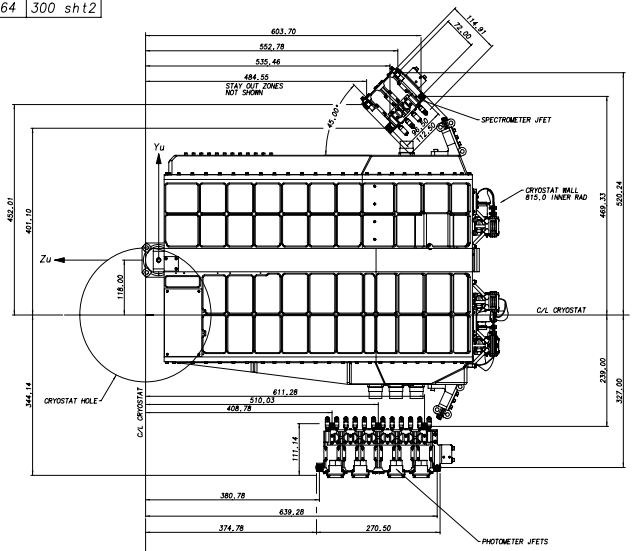
DRAWING No.		
A1	5264	300 sht2

THIRD ANGLE PROJECTION

DO NOT SCALE

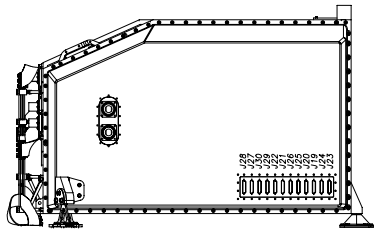
REMOVE ALL BURRS & SHARP EDGES

USED ON HERSCHEL



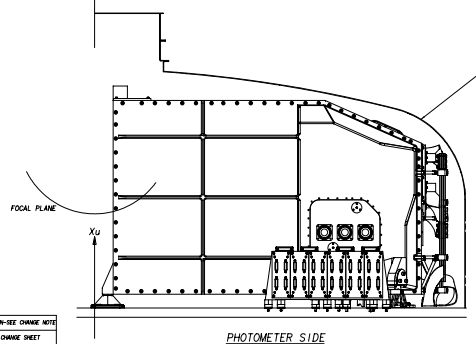
NOTE:-

ALL DIMENSIONS AT ROOM TEMPERATURE



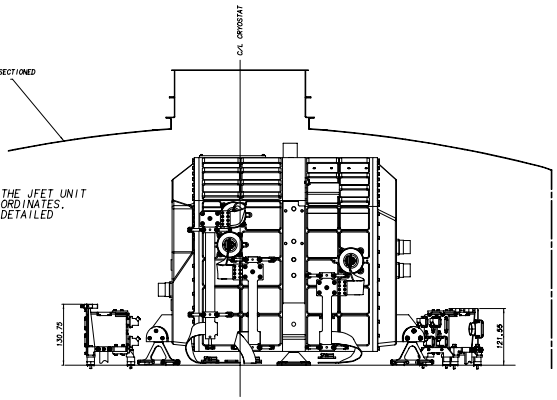
SPECTROMETER SIDE

(VIEWED IN -Yu DIRECTION)



PHOTOMETER SIDE

NOTE:-
THIS DRAWING REFERENCES THE JFET UNIT MOUNTINGS TO HOB S/C CO-ORDINATES. THE JFETS HAVE SEPARATE DETAILED INTERFACE DRAWINGS



ISSUE	DATE	AMENDMENT	
20	8/9/05	REDRAWN-SEE CHANGE NOTE	
19	19/02/04	SEE CHANGE SHEET	
18	4/07/03	SEE CHANGE SHEET	
17	16/10/02	SEE CHANGE SHEET	
16	28/08/02	MODIFICATIONS AND CHANGE SHEET CREATED DRAWING UPDATED TO ISSUE 16 THERE-ON	
15	27/04/01	THERMAL STRAP INTERFACE MODIFIED. LEVEL 1 STRAP FITING HOLES MOVED	
14	23/11/01	CENTRE OF GRAVITY ADDED TO SHT.1. J-FET DESIGN UPDATED, STAY OUT HOLES REMOVED.	
13	19/11/01	UPDATED RFI FILTER & PHOT CONNECTORS ADDED. FOCAL PLANE & 'A' FRAME MOUNT DIM ADDED. SHEET 7 ADDED	
1	24/11/01	COMPUTER FILE	

NOTE:-
SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS

CHECKED	TRACED	DRAWN
	PGC	AJC

PROTECTIVE FINISH
ALODINE 1200
(ST. STEEL PARTS NATURAL)

ESTD WT. 45.63kg (NO CONT) SEE NOTE SHT.1
ACTL WT.

MATERIAL & SPEC.
AS LISTED

DIMENSIONS IN mm

TOLERANCES UNLESS OTHERWISE STATED -
LINEAR +/- 0.10
ANGULAR +/- 0°15'

SCALE 1:4

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE: SPIRE INTERFACE (J-FET POSITIONS)

DRAWING No: A1 5264 300 sht2

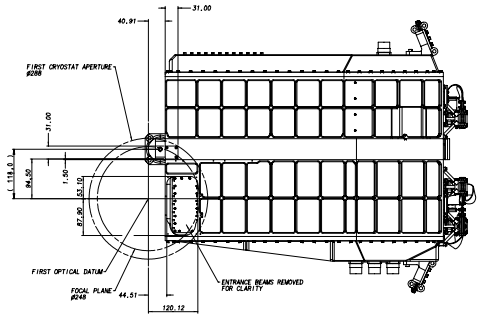
DRAWING No.		
A1	5264	300 sht3

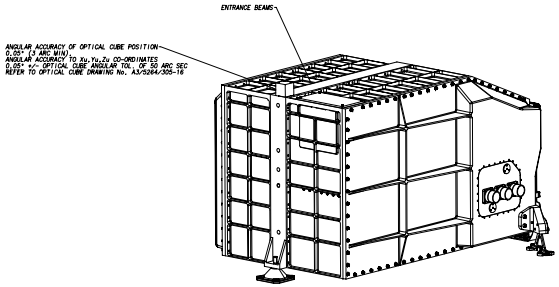
THIRD ANGLE PROJECTION

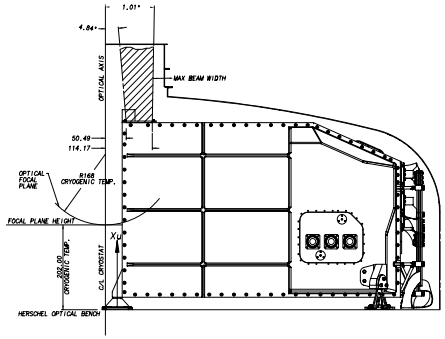
DO NOT SCALE

REMOVE ALL BURRS & SHARP EDGES

USED ON HERSCHEL

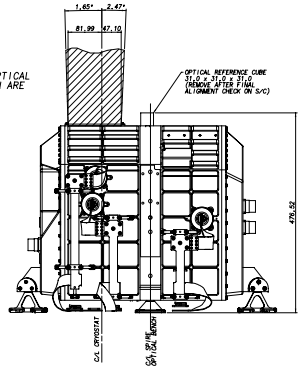






OPTICAL BEAM DIMENSIONS:-

ONLY DIMENSIONS DEFINING THE VOLUME FOR THE OPTICAL BEAMS WHICH SHALL REMAIN FREE FROM OBSTRUCTION ARE SHOWN.
REFER TO IID-B FOR MORE DETAILED INFORMATION



NOTE:-

1. ALL DIMENSIONS AT ROOM TEMPERATURE UNLESS OTHERWISE SPECIFIED

ISSUE	DATE	AMENDMENT
20	8/9/05	REDRAWN-SEE CHANGE NOTE
19	19/02/04	SEE CHANGE SHEET
18	4/07/03	SEE CHANGE SHEET
17	16/10/02	SEE CHANGE SHEET
16	28/08/02	MODIFICATIONS AND CHANGE SHEET CREATED DRAWING UPDATED TO ISSUE 16 THERE-ON
15	27/04/01	THERMAL STRAP INTERFACE MODIFIED. LEVEL 1 STRAP FIXING HOLES MOVED
14	23/11/01	CENTRE OF GRAVITY ADDED TO SHT.1. J-FET DESIGN UPDATED. STAY OUT HOLES REMOVED
13	19/11/01	UPDATED W/ FILTER & PIPE CONNECTORS ADDED. FOCAL PLANE & 1K FRAME MOUNT DIA REDEF. SHEET 7 ADDED
DRAWN	ISSUE	DATE
AJC	1	24/11/01

SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)

COMPUTER FILE

NOTE:-
SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS

CHECKED

TRACED PGC

PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
ALODINE 1200 (ST. STEEL PARTS NATURAL)	AS LISTED	LINEAR +/- 0.10 ANGULAR +/- 0°15'
ESTD WT. 40.43kg (NO CONT) SEE NOTE SHT.1		
ACTL WT.	DIMENSIONS IN mm	SCALE 1:4

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE: SPIRE INTERFACE (OPTICAL DETAILS)

DRAWING No: A1 5264 300 sht3

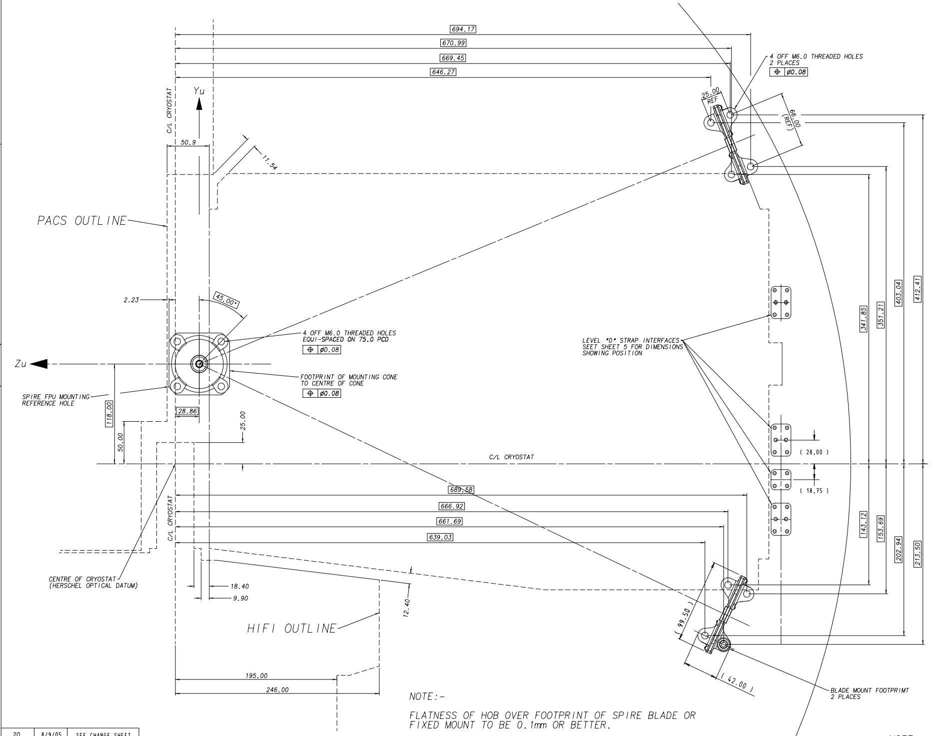
USED ON
HERSCHEL

DRAWING No.		
A1	5264	300 sht4

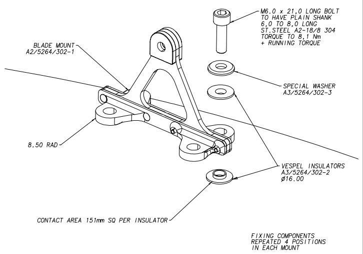
THIRD ANGLE PROJECTION

DO NOT SCALE

REMOVE ALL BURRS & SHARP EDGES



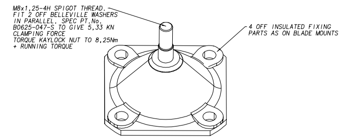
694.17
670.99
669.45
646.27
4 OFF M6.0 THREADED HOLES
2 PLACES
Ø0.08
Yu
C/L CRYOSTAT
50.9
11.54
PACS OUTLINE
2.23
45.00°
4 OFF M6.0 THREADED HOLES
EQUI-SPACED ON 75.0 PCD
Ø0.08
Zu
FOOTPRINT OF MOUNTING CONE
TO CENTRE OF CONE
Ø0.08
SPIRE FPU MOUNTING
REFERENCE HOLE
118.00
28.86
25.00
50.00
C/L CRYOSTAT
LEVEL "0" STRAP INTERFACES
SEET SHEET 5 FOR DIMENSIONS
SHOWING POSITION
(28.00)
(18.75)
689.58
666.92
661.69
639.03
C/L CRYOSTAT
CENTRE OF CRYOSTAT
(HERSCHEL OPTICAL DATUM)
18.40
9.90
12.40
HIFI OUTLINE
98.50
42.00
195.00
246.00
BLADE MOUNT FOOTPRINT
2 PLACES
341.85
351.21
403.14
412.41
143.12
153.69
202.94
213.50



M6.0 x 21,0 LONG BOLT
TO HAVE PLAIN SHANK
6,0 TO 8,0 LONG
ST.STEEL A2-18/8 304
TORQUE TO 8,1 Nm
+ RUNNING TORQUE
BLADE MOUNT
A2/5264/302-1
SPECIAL WASHER
A3/5264/302-3
8.50 RAD
VESPEL INSULATORS
A3/5264/302-2
Ø16.00
CONTACT AREA 151mm SQ PER INSULATOR
FIXING COMPONENTS
REPEATED 4 POSITIONS
IN EACH MOUNT

DETAIL OF BLADE MOUNT FIXINGS

SCALE 1:1



DETAIL OF FIXED MOUNTING

SCALE 1:1

NOTE:-

FLATNESS OF HOB OVER FOOTPRINT OF SPIRE BLADE OR FIXED MOUNT TO BE 0.1mm OR BETTER.

MAX.TILT OF HOB FROM HERSCHEL X AXIS TO BE 5 ARC.MIN. TO ENABLE SPIRE FPU TO BE MACHINED OR SHIMMED INTO ALIGNMENT (IF REQUIRED).

NOTE:-

1. ALL DIMENSIONS AT ROOM TEMPERATURE

	ISSUE	DATE	AMENDMENT
	20	8/9/05	SEE CHANGE SHEET
	19	19/02/04	SEE CHANGE SHEET
	18	4/07/03	SEE CHANGE SHEET
	17	16/10/02	SEE CHANGE SHEET
CHECKED	16	28/08/02	MODIFICATIONS AND CHANGE SHEET CREATED DRAWING UPDATED TO ISSUE 16 THERE-ON
	15	27/04/01	THERMAL STRAP INTERFACE MODIFIED. LEVEL 1 STRAP FIXING HOLES MOVED
TRACED PGC	14	23/11/01	CENTRE OF GRAVITY ADDED TO SHT.1. J-FET DESIGN UPDATED, STAY OUT HOLES REMOVED
	13	19/11/01	UPDATED RFI FILTER & PHOT CONNECTORS ADDED, FOCAL PLANE & 'A' FRAME MOUNT DIM ADDED. SHEET 7 ADDED
DRAWN AJC	1	24/11/01	

NOTE:-

SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS

SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)

COMPUTER FILE

PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
ALOCROM 1200 (ST.STEEL PARTS NATURAL)	AS LISTED	LINEAR +/- 0.10 ANGULAR +/- 0°15'
ESTD WT. 45,63kg (NO CONT) SEE NOTE SHT.1		
ACTL WT.	DIMENSIONS IN mm	SCALE 1:2 & 1:1

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE: SPIRE INTERFACE
(INTERFACE FIXING DETAILS)

DRAWING No: A1 5264 300 sht4

DRAWING No.

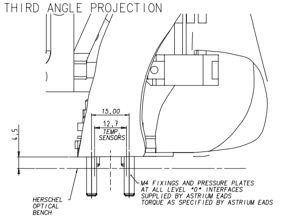
A1 5264 300 sht5

USED ON HERSCHEL

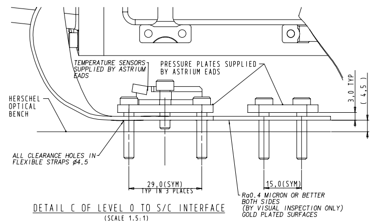
THIRD ANGLE PROJECTION

DO NOT SCALE

REMOVE ALL BURRS & SHARP EDGES



DETAIL "B" OF LEVEL "0" TO S/C INTERFACE
(SCALE 1.5:1)



TEMPERATURE SENSORS SUPPLIED BY ASTRIUM EADS
PRESSURE PLATES SUPPLIED BY ASTRIUM EADS
HERSCHEL OPTICAL BENCH
ALL CLEARANCE HOLES IN FLEXIBLE STRAPS Ø4.5
29,0(SYM)
TYP IN 3 PLACES
15,0(SYM)
Ra0,4 MICRON OR BETTER BOTH SIDES (BY VISUAL INSPECTION ONLY) GOLD PLATED SURFACES
3,0 TYP
(4,5)

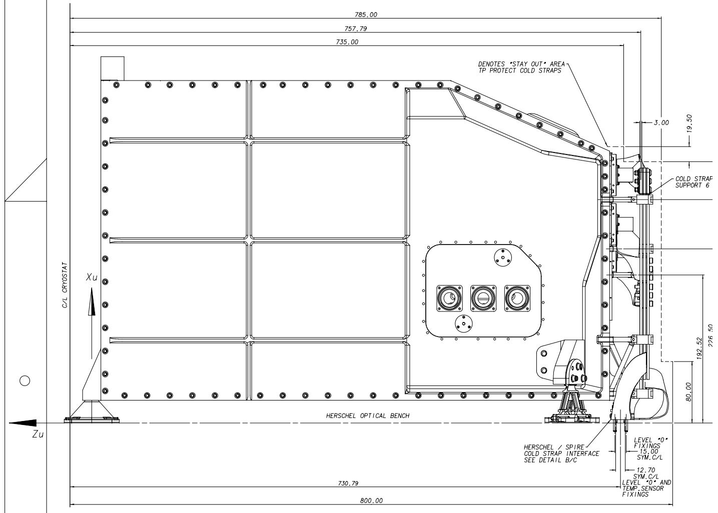
DETAIL C OF LEVEL 0 TO S/C INTERFACE
(SCALE 1.5:1)

HSFPU EXTERNAL FINISHES:-

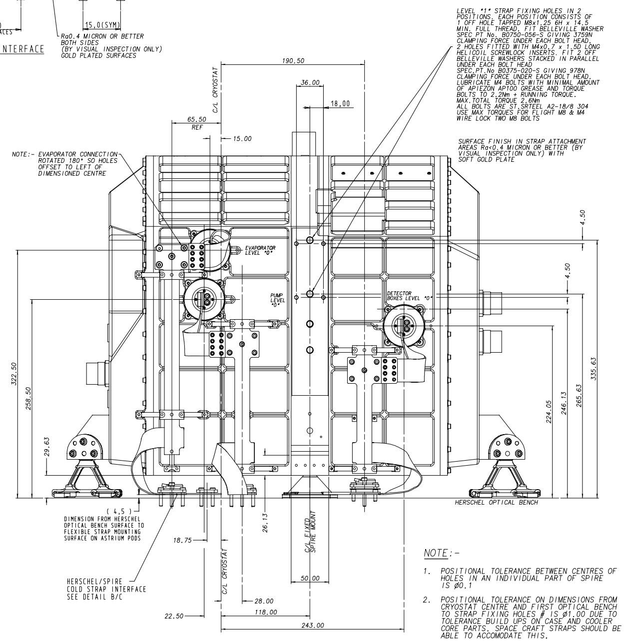
INSTRUMENT CASE AND EXTERNAL COVERS.	ALOCROM 1200
BLADE AND FIXED MOUNTING.	NATURAL ST.STEEL & CARBON FIBRE
EXTERNAL FIXINGS,	NATURAL ST.STEEL
COLD STRAPS	GOLD PLATED

NOTE:-

ANY THERMAL INTERFACE PROVISIONS NEEDED FOT THE JFET UNITS ARE SHOWN ON INTERFACE DRAWINGS RELATING TO THOSE UNITS.



785.00
757.79
735.00
DENOTES "STAY OUT" AREA TP PROTECT COLD STRAPS
3.00
19.50
COLD STRAP SUPPORT 6
C/L CRYOSTAT
Xu
Zu
HERSCHEL OPTICAL BENCH
192.52
226.50
80.00
HERSCHEL / SPIRE COLD STRAP INTERFACE SEE DETAIL B/C
LEVEL "0" FIXINGS
15.00 SYM.C/L
12.70 SYM.C/L
LEVEL "0" AND TEMP.SENSOR FIXINGS
730.79
800.00



LEVEL "1" STRAP FIXING HOLES IN 2 POSITIONS. EACH POSITION CONSISTS OF 1 OFF HOLE TAPPED M8x1.25 6H x 14.5 MIN. FULL THREAD. FIT BELLEVILLE WASHER SPEC PT No. B0750-056-S GIVING 3759N CLAMPING FORCE UNDER EACH BOLT HEAD.
2 HOLES FITTED WITH M4x0.7 x 1.5D LONG HELICOIL SCREWLOCK INSERTS. FIT 2 OFF BELLEVILLE WASHERS STACKED IN PARALLEL UNDER EACH BOLT HEAD
SPEC.PT.No B0375-020-S GIVING 978N CLAMPING FORCE UNDER EACH BOLT HEAD.
LUBRICATE M4 BOLTS WITH MINIMAL AMOUNT OF APIEZON AP100 GREASE AND TORQUE BOLTS TO 2.2Nm + RUNNING TORQUE.
MAX.TOTAL TORQUE 2.6Nm
ALL BOLTS ARE ST.SRTEEL A2-18/8 304
USE MAX TORQUES FOR FLIGHT M8 & M4
WIRE LOCK TWO M8 BOLTS
SURFACE FINISH IN STRAP ATTACHMENT AREAS Ra<0.4 MICRON OR BETTER (BY VISUAL INSPECTION ONLY) WITH SOFT GOLD PLATE
190.50
36.00
18.00
65.50 REF
15.00
C/L CRYOSTAT
NOTE:- EVAPORATOR CONNECTION ROTATED 180° SO HOLES OFFSET TO LEFT OF DIMENSIONED CENTRE
EVAPORATOR LEVEL "0"
PUMP LEVEL "0"
DETECTOR BOXES LEVEL "0"
4.50
322.50
258.50
29.63
224.05
246.13
265.63
335.63
HERSCHEL OPTICAL BENCH
(4,5)
DIMENSION FROM HERSCHEL OPTICAL BENCH SURFACE TO FLEXIBLE STRAP MOUNTING SURFACE ON ASTRIUM PODS
18.75
26.13
C/L FIXED SPIRE MOUNT
50.00
HERSCHEL/SPIRE COLD STRAP INTERFACE SEE DETAIL B/C
28.00
118.00
22.50
243.00

NOTE:-

1. POSITIONAL TOLERANCE BETWEEN CENTRES OF HOLES IN AN INDIVIDUAL PART OF SPIRE IS Ø0.1

2. POSITIONAL TOLERANCE ON DIMENSIONS FROM CRYOSTAT CENTRE AND FIRST OPTICAL BENCH TO STRAP FIXING HOLES # IS Ø1.00 DUE TO TOLERANCE BUILD UPS ON CASE AND COOLER CORE PARTS. SPACE CRAFT STRAPS SHOULD BE ABLE TO ACCOMODATE THIS.

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	13	19/11/01	UPDATED RFI FILTER & PHOT CONNECTORS ADDED, FOCAL PLANE & 'A' FRAME MOUNT DIM ADDED, SHEET 7 ADDED
DRAWN AJC	1	24/11/01	

NOTE:-

SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS

SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)

COMPUTER FILE

NOTE:-

ALL DIMENSIONS AT ROOM TEMPERATURE

PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
ALOCROM 1200 AND SOFT GOLD PLATE (ST.STEEL PARTS NATURAL)	AS LISTED	LINEAR +/- 0.10 ANGULAR +/- 0°15'
ESTD WT. 45,63kg (NO CONT) SEE NOTE SHT.1		
ACTL WT.	DIMENSIONS IN mm	SCALE 0.45:1 & 2:1

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
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TITLE SPIRE INTERFACE (THERMAL STRAP CONNECTIONS)

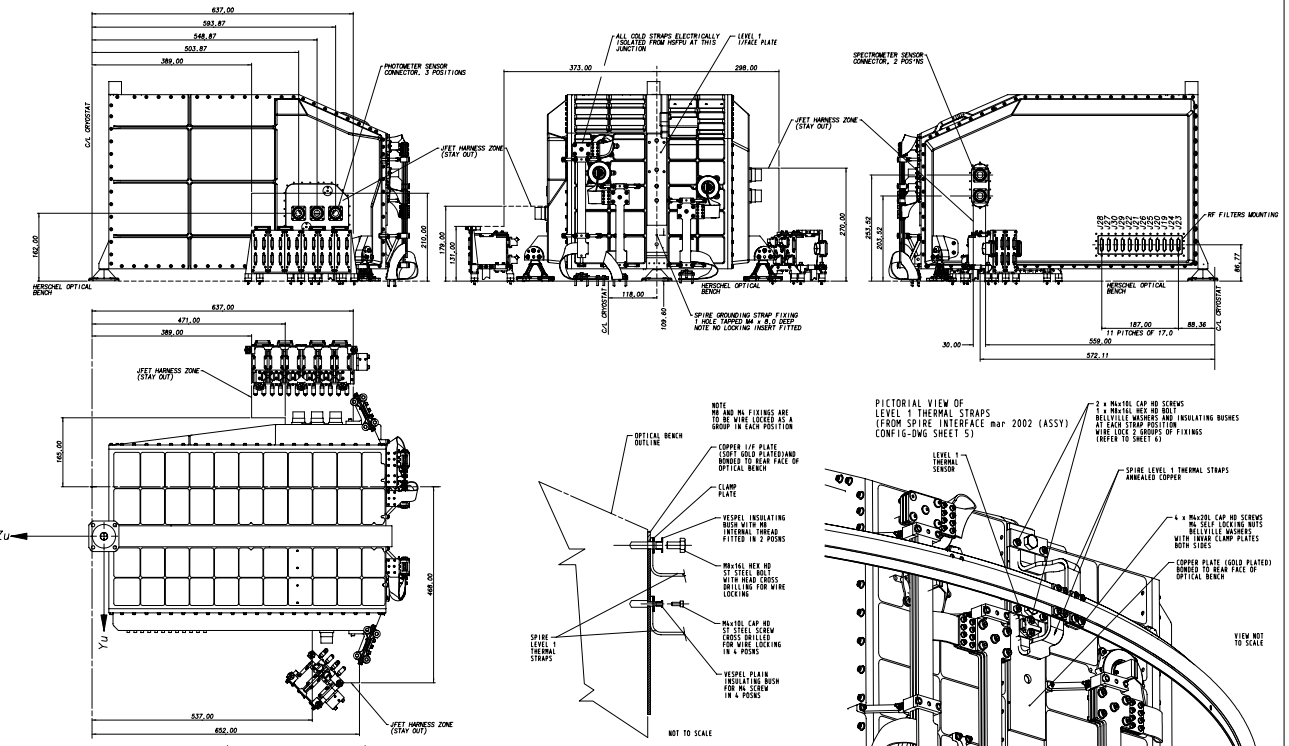
DRAWING No A1 5264 300 sht5

SHEET 5 OF 7

DRAWING No.		
A1	5264	300 sht6

THIRD ANGLE PROJECTION | DO NOT SCALE | REMOVE ALL BURRS & SHARP EDGES

USED ON HERSCHEL



VIEW ON Xu (UNDERSIDE OF SPIRE)

NOTE:-
1. ALL DIMENSIONS AT ROOM TEMPERATURE

ISSUE	DATE	AMENDMENT	
20	13/02/05	REDRAWN-SEE CHANGE SHEET	
19	19/02/04	SEE CHANGE SHEET	
18	4/07/03	SEE CHANGE SHEET	
17	16/10/02	SEE CHANGE SHEET	
16	28/08/02	MODIFICATIONS AND CHANGE SHEET CREATED DRAWING UPDATED TO ISSUE 16 THEREON	NOTE:- SEE CHANGE SHEET FOR DETAILS OF CHANGES MADE FROM ISSUE 16 ONWARDS
15	27/04/01	THERMAL STRAP INTERFACE MODIFIED, LEVEL 1 STRAP FIXING HOLES MOVED	
14	23/11/01	CENTRE OF GRAVITY MOVED TO SUIT:- J-FET DESIGN UPDATED, STAY OUT HOLES REMOVED	
13	19/11/01	DETAILED PCI FILTER & PWR CONNECTORS ADDED, ZOOM PLANE & "A" FRAME MOUNT DIM ADDED. SHEET 7 ADDED	
1	24/11/01	COMPUTER FILE	SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)

CHECKED	TRACED	DRAWN
	PGC	AJC

PROTECTIVE FINISH	MATERIAL & SPEC.	TOLERANCES UNLESS OTHERWISE STATED -
ALODRIM 1200 AL PARTS SELECTIVE GOLD PLATE ON COPPER PARTS (OTHER PARTS NATURAL)	AS LISTED	LINEAR +/- 0.10 ANGULAR +/- 0°15'
ESTD WT. 53.43kg (NO CONT) SEE NOTE SHT.1		
ACTL WT.	DIMENSIONS IN mm	SCALE 1:4

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
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TITLE: SPIRE INTERFACE

DRAWING No		
A1	5264	300 sht6

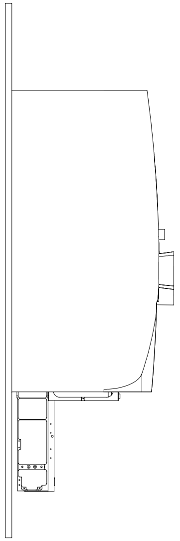
DRAWING No.		
A1	5264	300 sht7

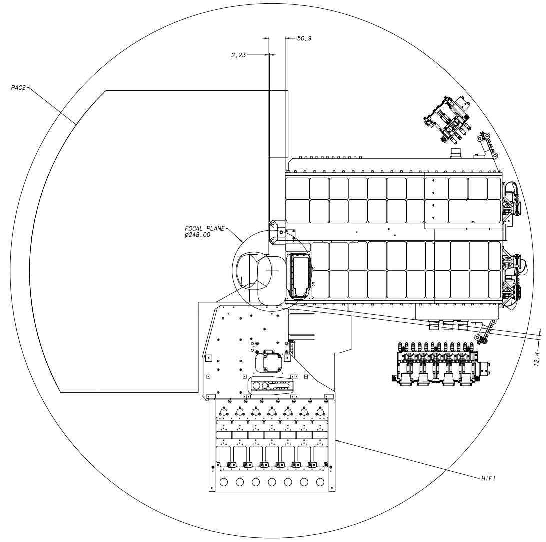
USED ON HERSCHEL

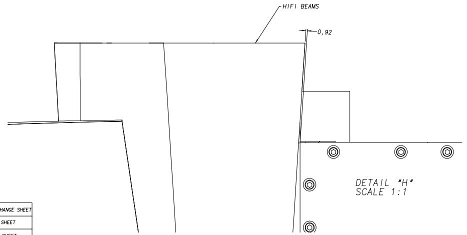
THIRD ANGLE PROJECTION

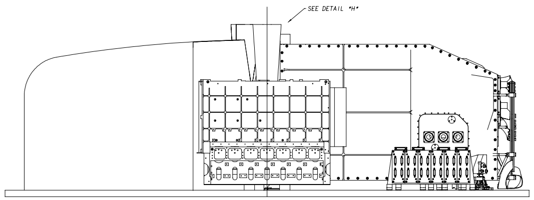
DO NOT SCALE

REMOVE ALL BURRS & SHARP EDGES









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NOTE:-

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SPIRE INTERFACE mar 2002 (ASSEMBLY MODEL)

COMPUTER FILE

PROTECTIVE FINISH
ALOCROM 1200 (ST.STEEL PARTS NATURAL)

ESTD WT. 45,63kg (NO CONT) SEE NOTE SHT.1

ACTL WT.

MATERIAL & SPEC.
AS LISTED

DIMENSIONS IN mm

TOLERANCES UNLESS OTHERWISE STATED -
LINEAR +/- 0.10
ANGULAR +/- 0°15'

SCALE

DEPARTMENT OF SPACE AND CLIMATE PHYSICS
UNIVERSITY COLLEGE LONDON
MULLARD SPACE SCIENCE LABORATORY, HOLMBURY ST. MARY, DORKING, SURREY.

TITLE
SPIRE INTERFACE
(PACS & HIFI OPTICAL & CLEARANCES)

DRAWING No		
A1	5264	300 sht7