esa	MINUTES OF MEETING	Date : 11/04/2000 Ref : PT-MM-07651 Page : 1 of ~~3~~ 8

SUBJECT: FIRST Techn. Meeting with SPIRE

PLACE: ESTEC room Cg 123 on 11-04-2000, starting at 09:00hrs.

Participants	Organ.	Distribution
M. Griffin (p.t.)	QMWC	Participants +
K. King	RAL	FIRST/Planck Project
B. Swinyard	RAL	
B. Winter	MSSL	
A. Heske	ESTEC	
T. Passvogel	ESTEC	
G. Pilbratt (p.t.)	ESTEC	
B. Collaudin (p.t.)	ESTEC	

AGREEMENTS STATEMENTS	ACTION
Agenda attached (A1) ① Next meetings dates: 08/06/00 26/09/00 ② Action Items ESA reminded SPIRE to provide monthly reports. ④ Design/Development Status * SPIRE gave status on latest design changes: - no SPARC, DSPs only; M-processors w/ DPU and DRCU - BAU may not be needed but wiring would result in 500 Ω resistance.	

AGREEMENTS STATEMENTS	ACTION
SPIRE needs to detail the requirements, (loads, shielding, capacitance, inductance, resistance!)	AI 01 13/04/00 SPIRE
* SPIRE reported on JFET design status. • Box would need a stand to get above the pipework (He gas) • Box could be reduced in size • Mass ~6 kg incl. stand (increase of factor 2.5), Needs to be reduced. It is agreed to remove the stand and to mount the unit directly on the optical bench (this implies that the routine will be adapted) • Given connector separation rules (IID-A) MDM 37 way would be needed; which has the impact on mass.	
(see Attachment 2)	
* Beam Steering Mechanism. • mechanically re-designed (to increase stiffness) • frequency 2Hz → would decrease dissipation • SPIRE confirmed that chopper is not mission critical	

AGREEMENTS STATEMENTS	ACTION
* FTS • Read out now at 80Hz • SPIRE confirms total data rate to be below 100 kbps. • No co-adding on board. * Sorption cooler • implementation responsibility of proposed design of the thermal busbar is not yet clear • redundancy / reliability The technical note on the redundancy concepts provided by SPIRE is under evaluation by ESA * Cryo Harness SPIRE pointed out that they need to design / implement test-cryo harness mid-end 2001 i.e. already start of s/c ΦB. This schedule discrepancy was flagged as a potential problem. Harness design issues will remain in techn. meetings.	

AGREEMENTS STATEMENTS	ACTION
(5) Verification / Model Philosophy • As part of CQM tests SPIRE wishes to test thermal balance of FPU, which needs gas flow of 2.5mg/s (instead of 30mg envisaged for ground tests). Objective needs to go into IID-B. SPIRE is preparing techn. note. • SPIRE would like requirement on radiative susceptibility in IID-A - will be followed up in EDC-WG. • Straylight verification: SPIRE will include requirement in IID-B.	AI02 14/04/00 SPIRE

AGREEMENTS STATEMENTS	ACTION
Resume ④ mechanical/thermal Design FPU (see attachment 3) • SPIRE presented latest, slightly updated, optical and thermal/mechanical design. Mathematical models will be updated, accordingly. • Given the design of the A-frame SPIRE would prefer Al interface (optical bench) (A-frames at present will not be able to support 2mm-displacements - for the case of carbon fibre OB.) (see Attachment 4) SPIRE should look into changing length to accommodate deflection. Concept does not follow standard given in IID-A - needs to be addressed in IID-B (how compliance will be ensured) • Interface Drawing (see attachment 5) Front edge of mounting cone infringes PACS mounting zone - ESA will take up with PACS 13-15/04/00. • SPIRE requested 2 x 2K straps (through OB). Design and straylight issues need to be looked into. • ESA will provide thermal model of Cryostat optical bench to SPIRE.	AI 03 10/05/00 ESA

AGREEMENTS STATEMENTS	ACTION
Resume ④ Operating Modes (only one parallel mode remains) Parallel : PACS is prime SPIRE · photometric channel only · reduced data rate (~10kbps) · cooler needs to be recycled Partner : term should be deleted. Serendipity : SPIRE is prime details for PACS operat. to be defined. Peak-up : not a routine (discussed during AOCS meeting)	
Resume ⑤ Verification / Model Philosophy AVM Philosophy and purpose was discussed. Further inputs from instruments are needed. SPIRE will send theirs this week.	AI 04 14/04/00 SPIRE

AGREEMENTS STATEMENTS	ACTION
Schedule and Criticality: SPIRE foresees additional structural tests prior to CQM tests. SPIRE confirms schedule inputs from subsystems by end of week. SPIRE will produce consolidated development plan. ESA asks for inputs currently "tbd" in IID-B under ch. 7 & 9.	AI 05 08/05/00 SPIRE
⑥ IIDs A) SPIRE comments from 07/03/00 were reviewed. ESA answers see ANNEX 6. Alignment SPIRE should re-send their comments on FIRST Alignment Plan	AI 06 19/04/00 SPIRE
B) Temperature channels Temperature range should be increased to bake-out temp. (350 K) Data rates ESA will provide clarification.	

AGREEMENTS STATEMENTS	ACTION
SPIRE will provide updated IID-B including issues discussed during this meeting.	
③ ISVR follow-up	
Documents to be provided:	
• Instrument Design Description (needs to be assembled)	AI 07/12/05/00 SPIRE
• Other documents existing, need updating.	

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Action Item Initiation Sheet

Title: FIRST Techn. Meeting with SPIRE

Place: ESTEC room Cg 123 on 11-04-2000, starting at 09:00hrs.

Date : 11/04/2000
Ref : PT-MM-07651
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Ordinal Action Number	Title and Description	Due Date 2000	Originator		Actionee		Completion	
			Firm	Person	Firm	Person	Date	By Document No.
01	Detailed reqs on wiring FPU-DRCU (loads, shielding, etc.)	13/04	ESA		SPIRE		12/04	e-mail
02	Define objectives for CQM tests and provide techn. note	14/04	ESA		SPIRE			
03	Provide thermal model of cryostat OB	10/05	SPIRE		ESA			
04	Provide inputs re AVM philosophy and purpose	14/04	ESA		SPIRE			
05	Provide consolidated development plan	08/05	ESA		SPIRE			
06	Re-send comments on FIRST Alignm. Plan	19/04	ESA		SPIRE			
07	Provide update Instr. Design Description	12/05	ESA		SPIRE			

ANNEX 1

esa

Astrid Heske 03/04/2000 08:27

To: m.j.griffin@qmw.ac.uk, k.j.king@rl.ac.uk
cc: Thomas Passvogel/estec/ESA@ESA, gilbrat@astro.estec.esa.nl, first.planck@estec.esa.nl
Subject: FIRST SPIRE Technical Meeting 11/04/00 - Agenda

Ref: SCI-PT/07605

Dear Ken, dear Matt,

The first technical meeting between SPIRE and ESA Project will take place:
11/04/00 in ESTEC Cg 123 starting **09:00** with the following agenda:

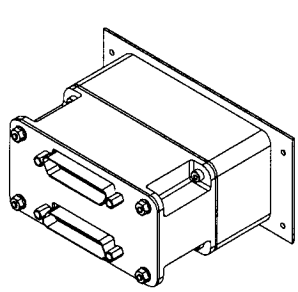
1) **Next meetings dates**
2) **Review AI's**
3) **ISVR follow-up** pm.
   a) Report
   b) Plans for Delta review
4) **Instrument Design/Development Status**
   a) Detector Selection
      (status of next steps)
   b) Buffer Amplifier Unit
   c) Warm Electronics
      (microprocessor, OBSW)
   d) Operating Modes pm.
      (partner, parallel, observation)
5) **Instrument Development/Verfication/Qualification/Model Philosophy**
   (requirements for AVM and CQM)
6) **IID updates**
   a) IID-B
   b) IID-A
7) **Instrument Management and Schedule**
8) **AOB**

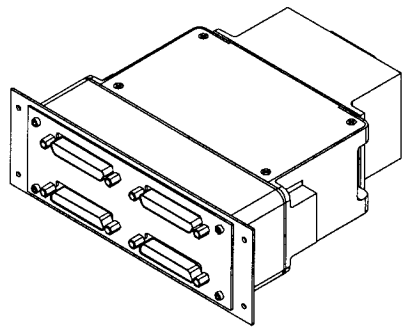
From ESA side Thomas Passvogel, Goeran Pilbratt and myself will attend.
Could SPIRE confirm their attendance by 7 april.

Kind regads,

Astrid Heske

RF Filter Module and JFET Module Design

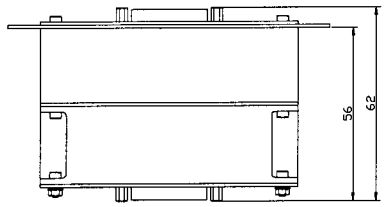


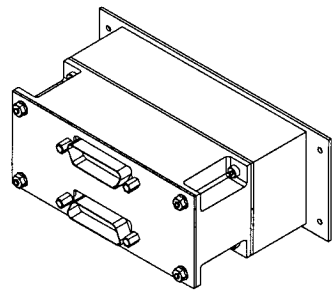


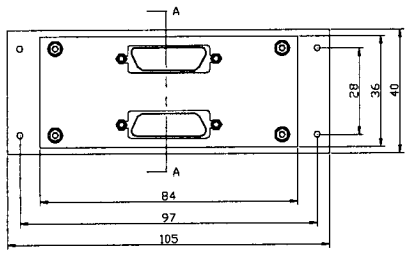
Dustin Crumb

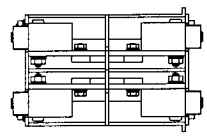
March 20, 2000

51 Pin RF Filter Module

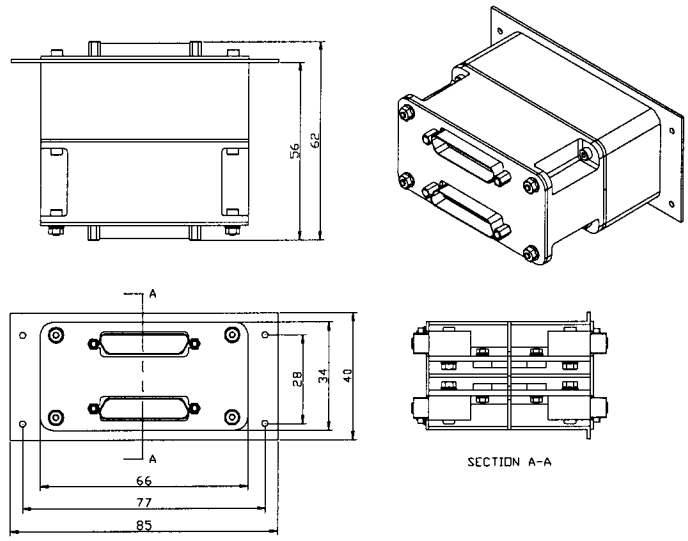


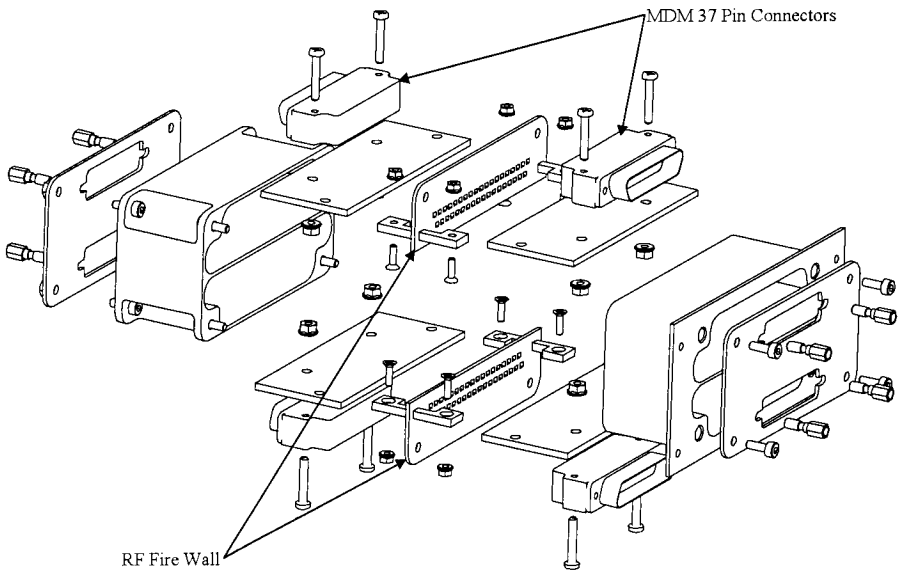






37 Pin RF Filter Module

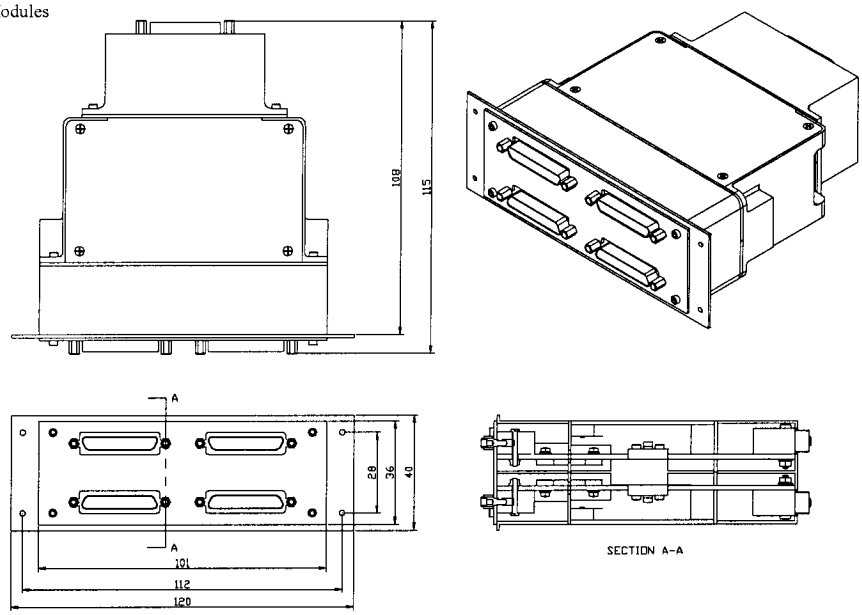


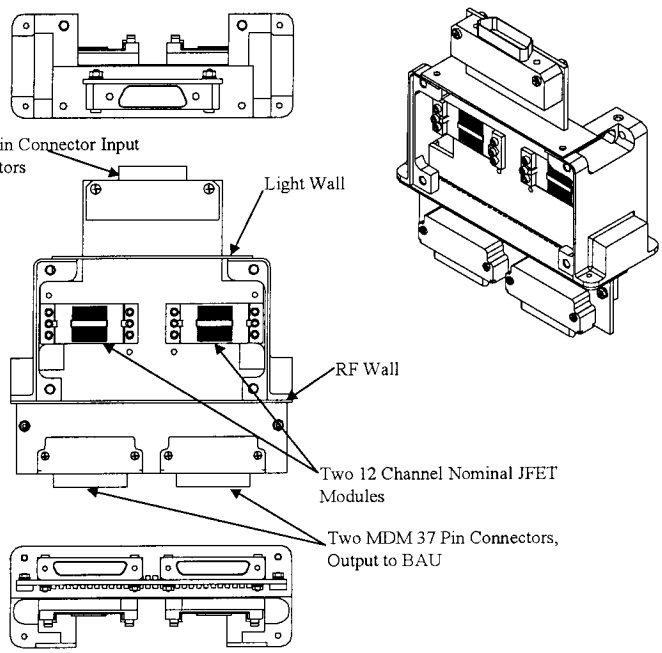


A2

3/9

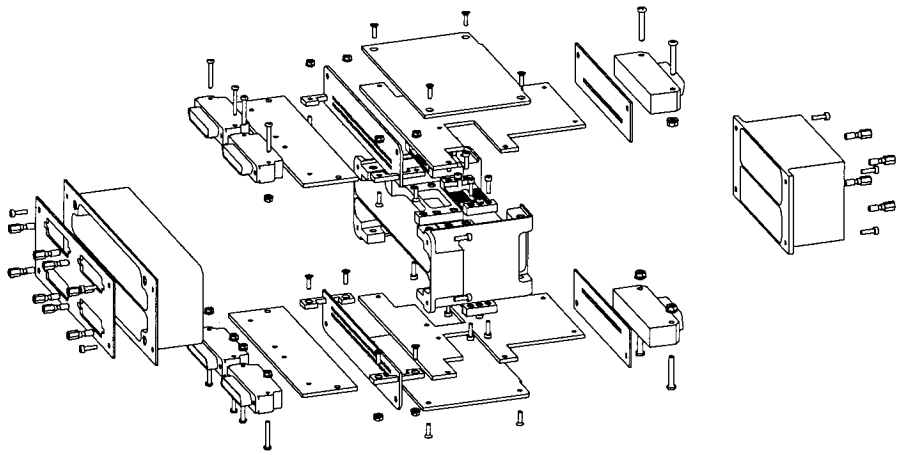
Two, 24 Channel JFET
Modules





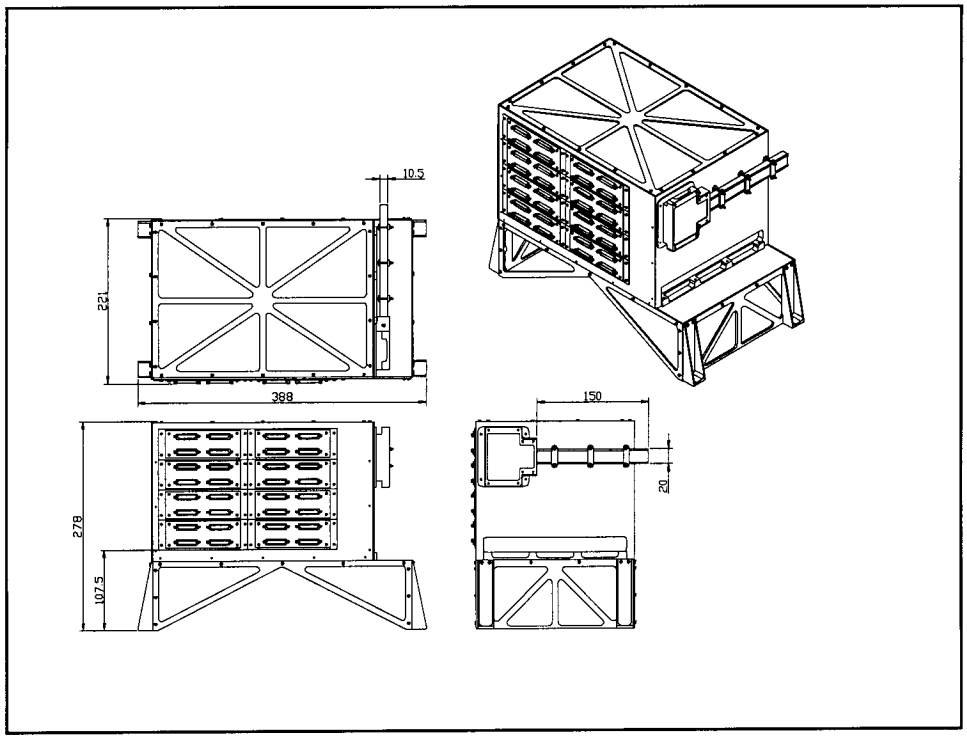
A2 4/9

Two, 24 Channel JFET Modules



Issues with design of JFET Box

- Length of thermal isolation between 4K and 10K for cables
- Cable routing to JFET box
- Serviceability of JFET modules (Ability to attach and remove cables)
- GSE to support JFET box from Instrument during transport
- Location for RF Filter Modules
- Requirements in the IIDA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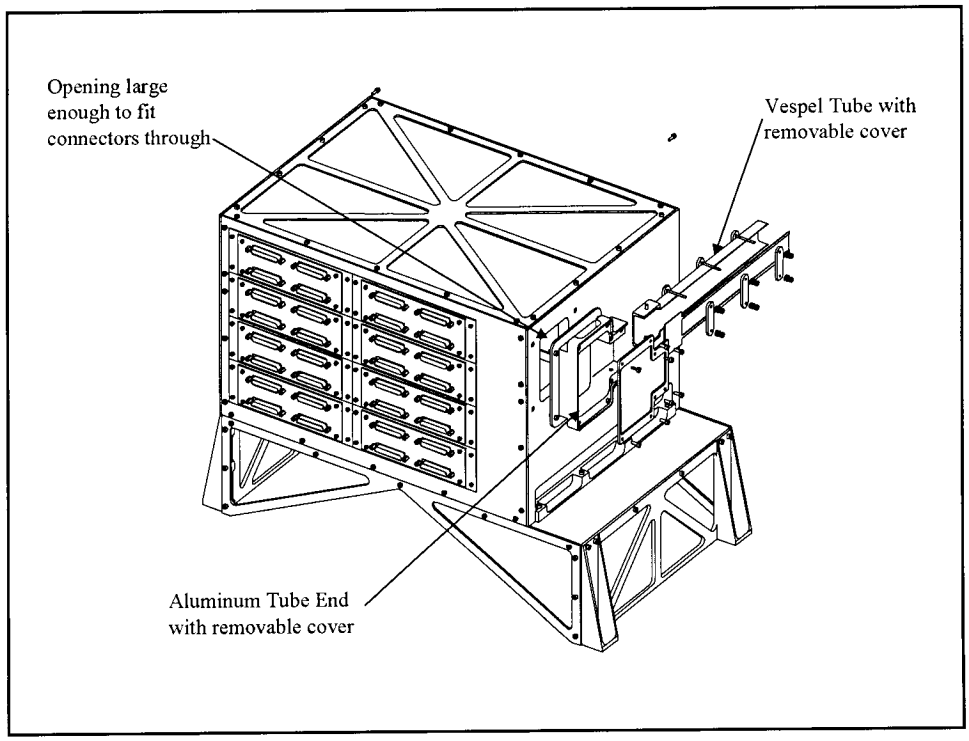
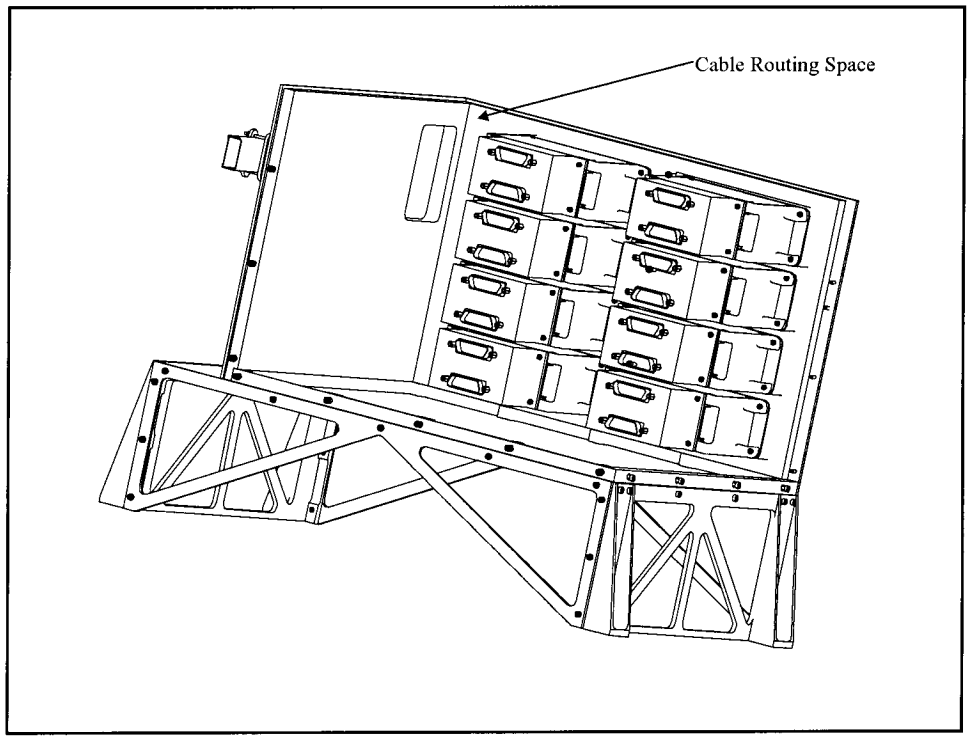
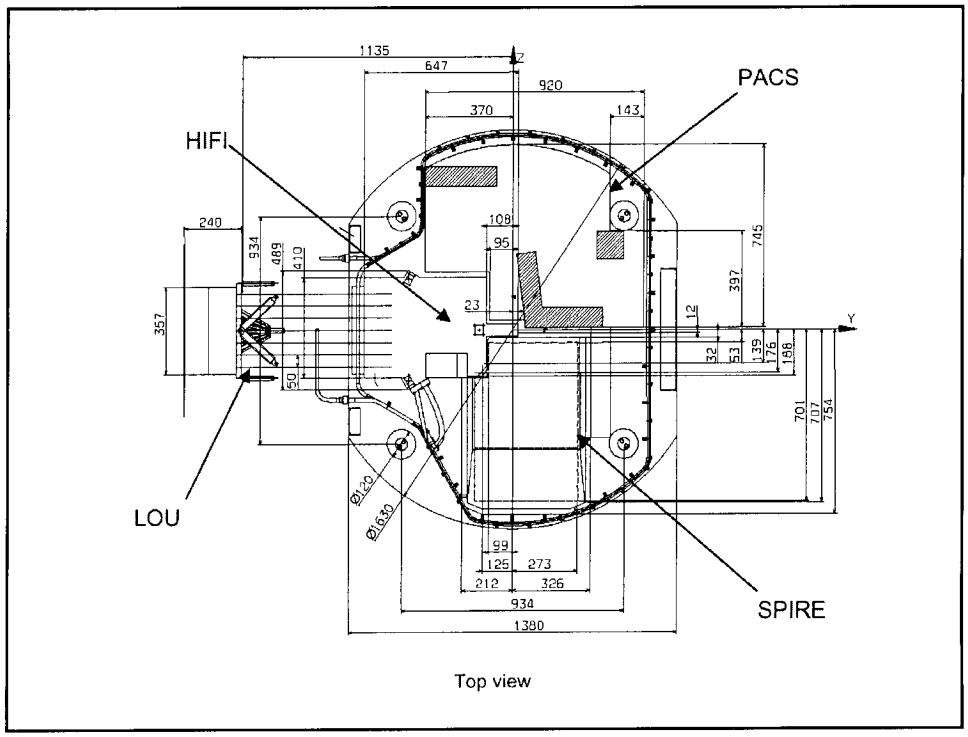
278
107.5


Opening large enough to fit connectors through
Vespel Tube with removable cover
Aluminum Tube End with removable cover


Cable Routing Space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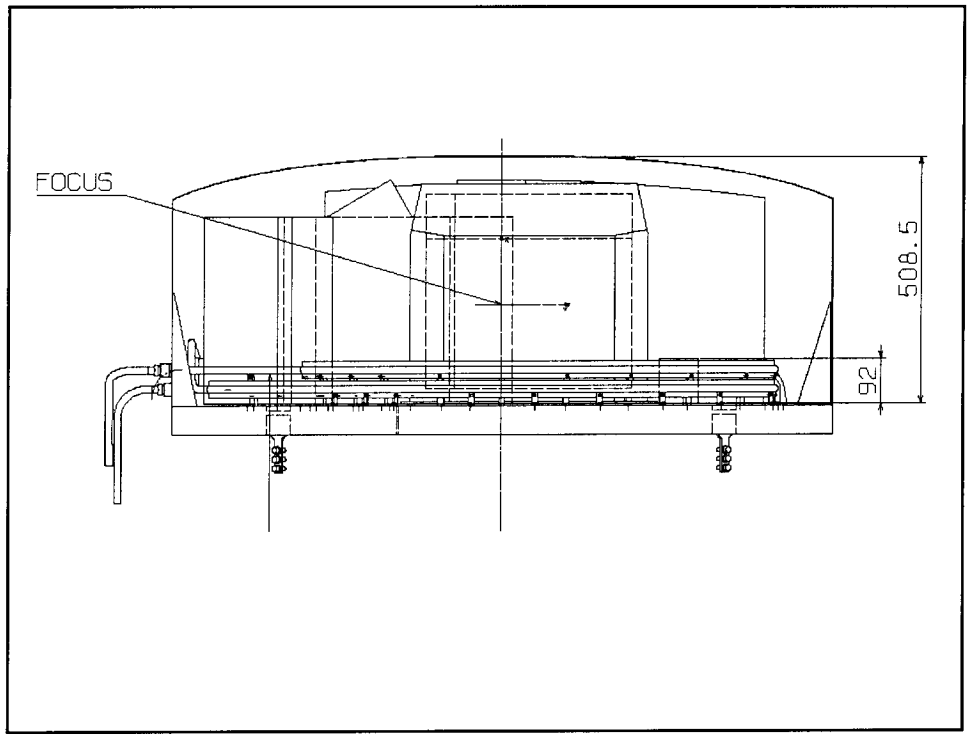
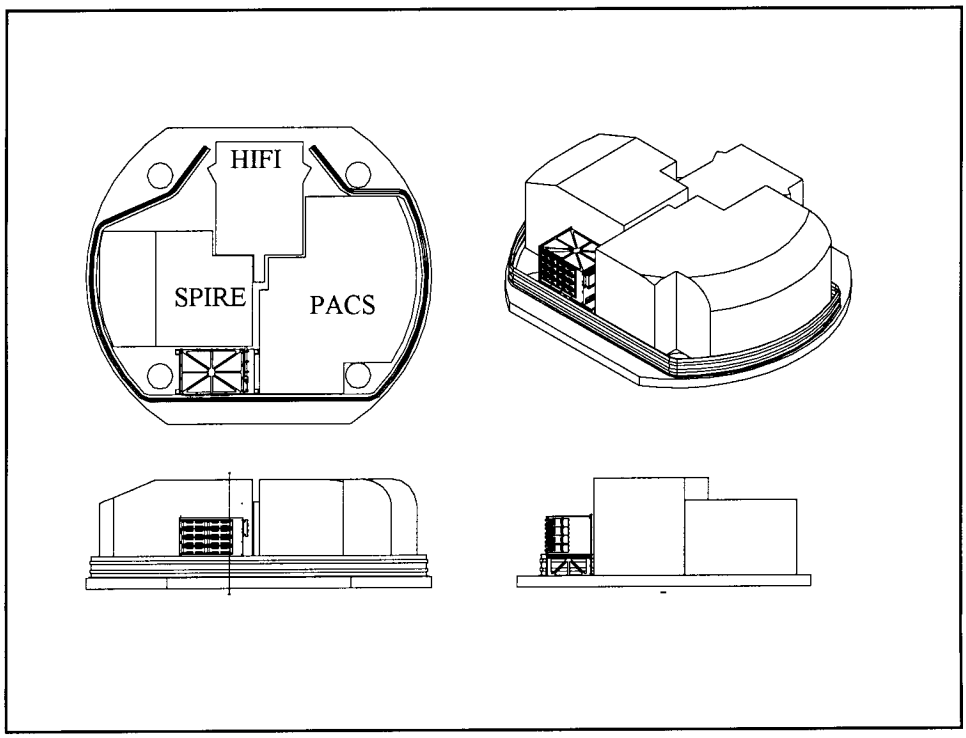
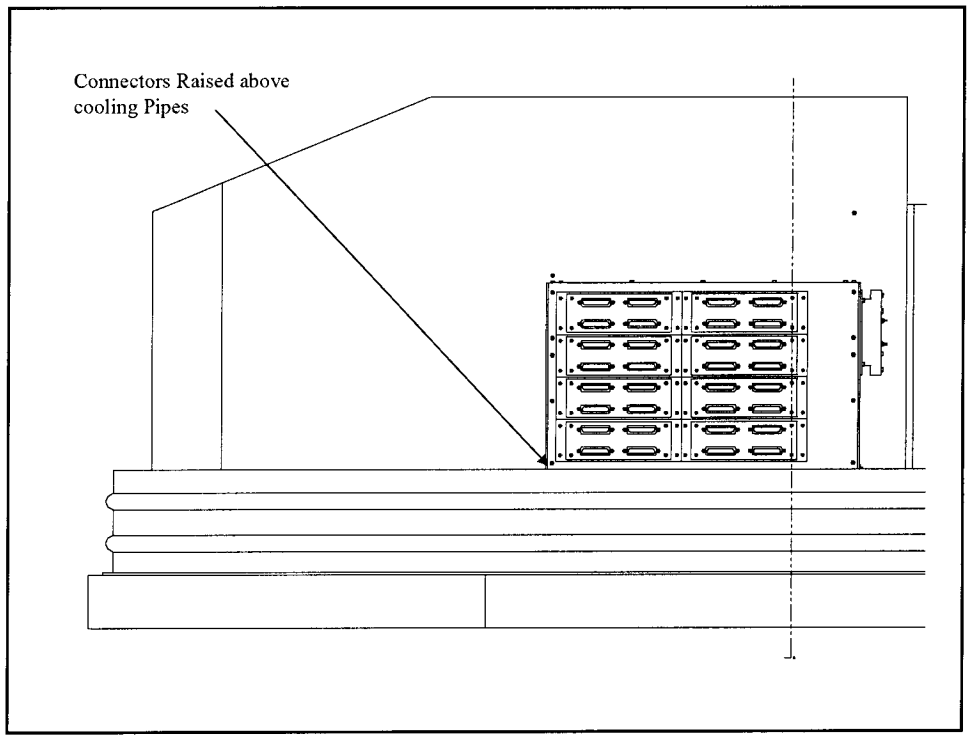
Top view

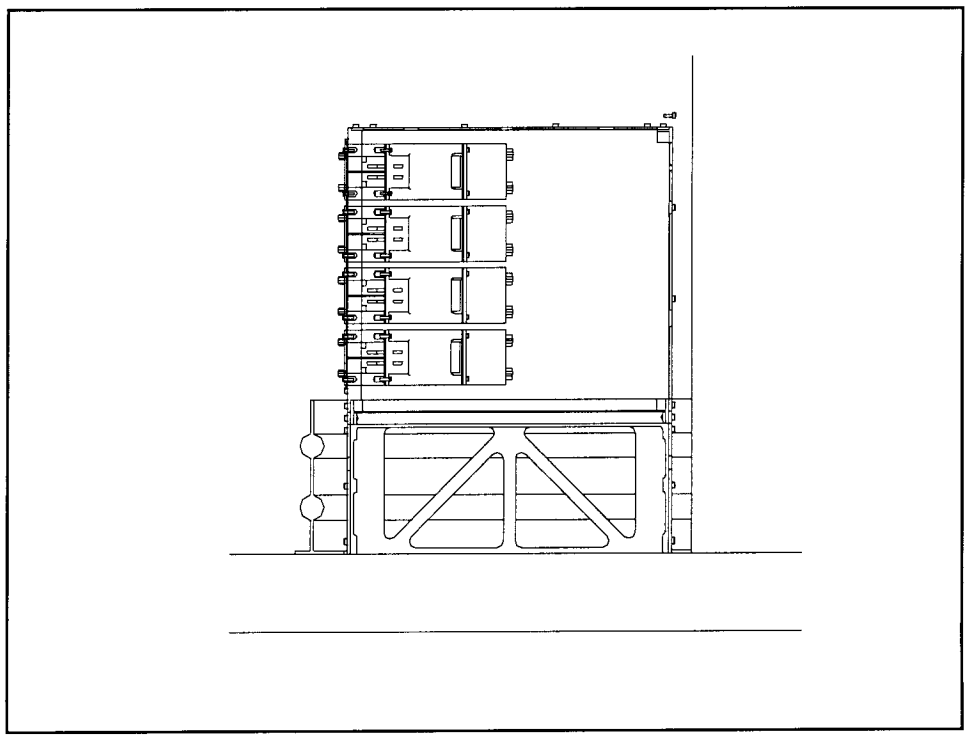
A2 7/9





A2 8/9





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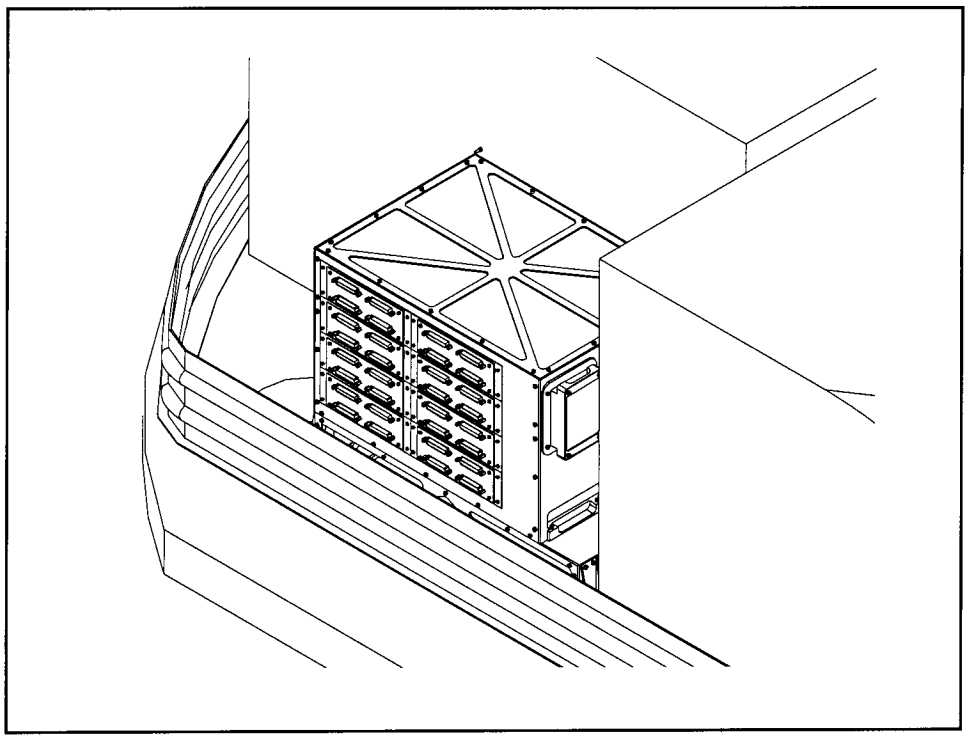
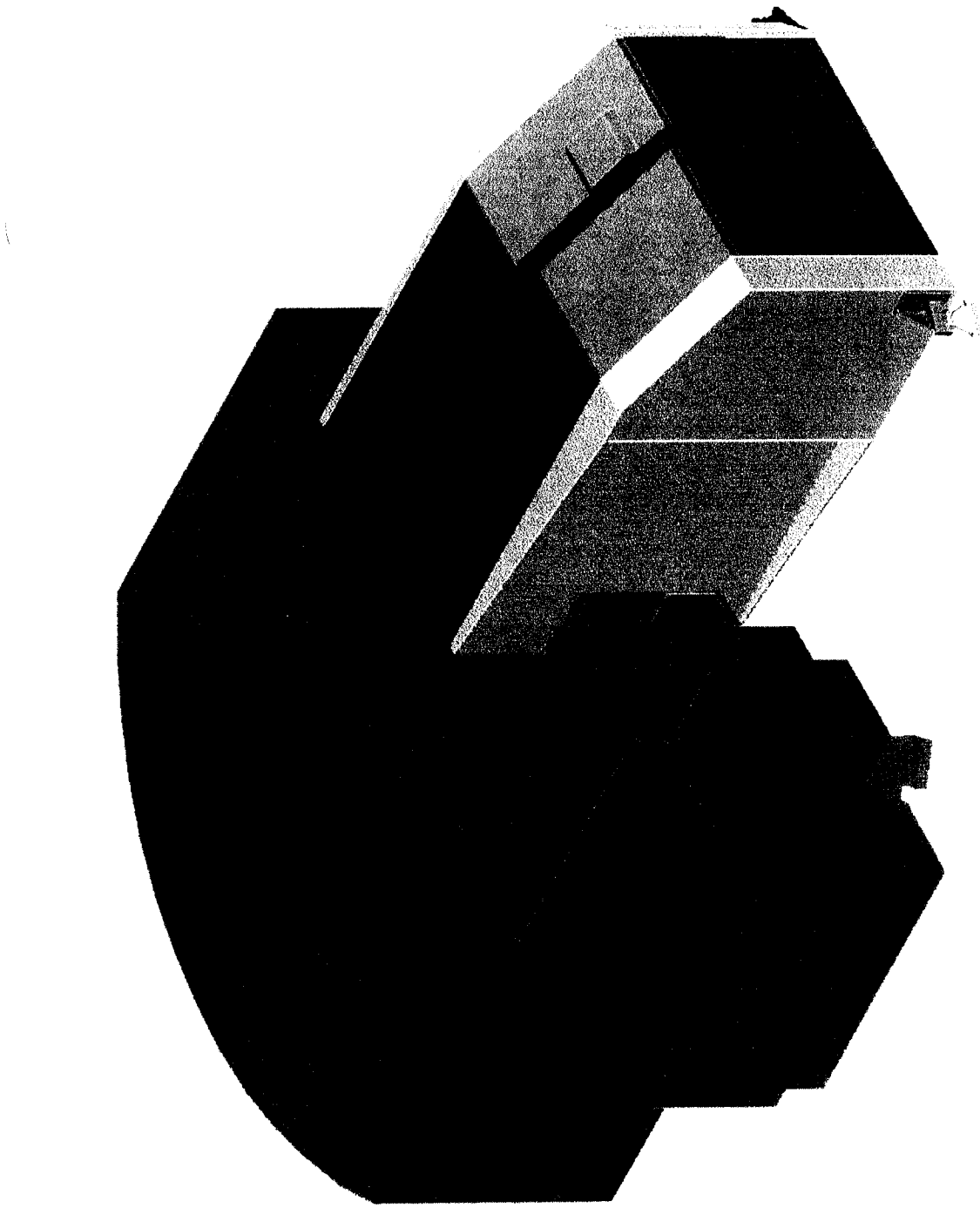


JFET Module Mass

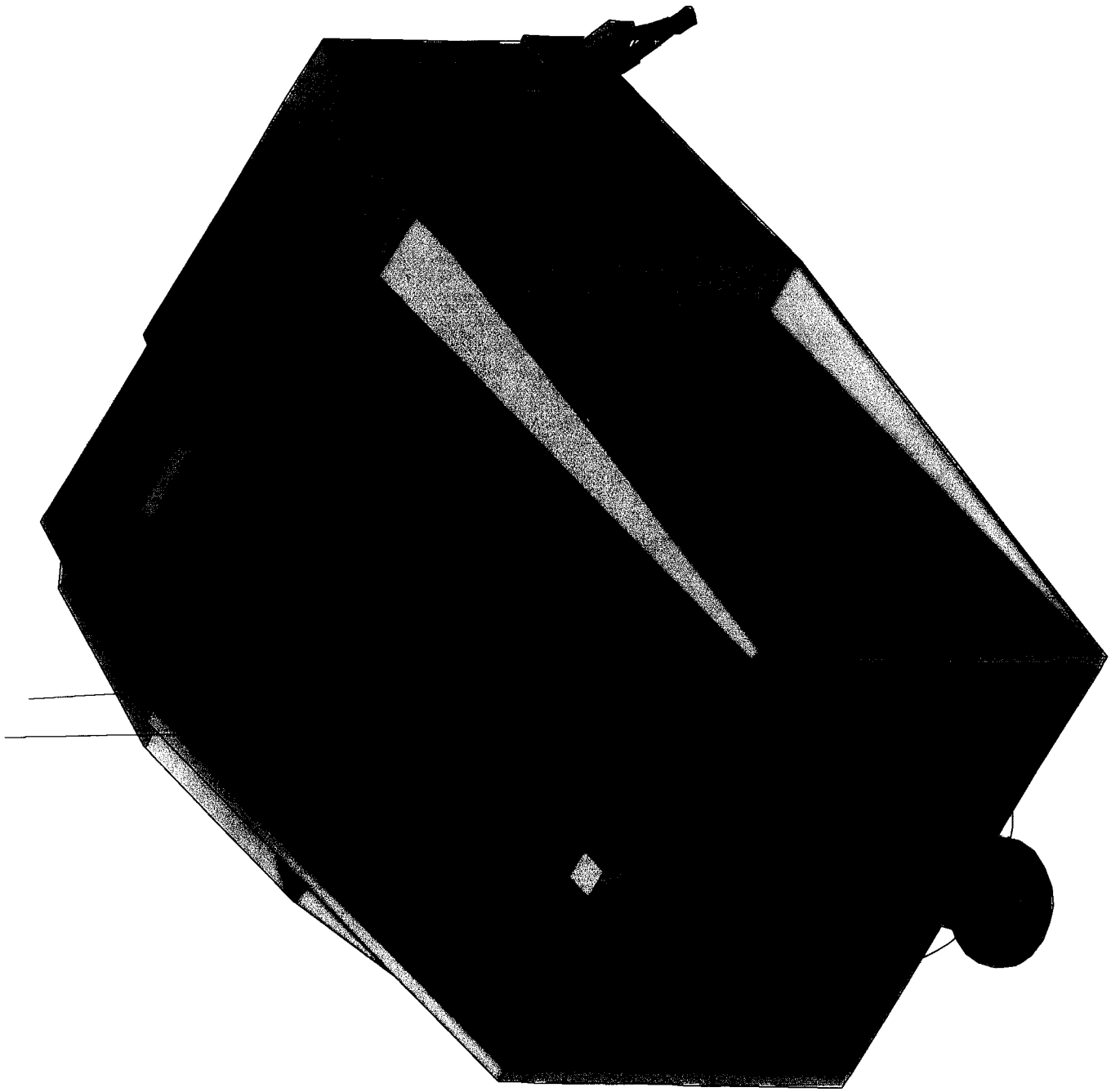
Part	Mass	Quanity	Total Mass	Assembly Mass
Jfet Module	**470.5**	**8**		**3764**
Jfet Chasis 1	26	1	26	
Jfet Chasis 2	44	1	44	
Mid Channel	59	1	59	
Light	3.5	2	7	
RF Seal	6	2	12	
Rf Filters	1	60	60	
MDM 37	20	4	80	
MDM 51	25	2	50	
Hardware	19	1	19	
Jfet Board 1	13	2	26	
Jfet Board 2	7	2	14	
Face	7.5	1	7.5	
Jfet Lids	17	2	34	
Jfets	8	4	32	

37 Pin RF Filter Module Mass

Part	Mass	Quanity	Total Mass	Assembly Mass
RF Filter Modules	**252**	**6**		**1512**
Chasis 1	21	1	21	
Chasis 2	37	1	37	
RF Seal	4	2	8	
MDM 37	20	4	80	
Face	5	2	10	
Board	5	4	20	
Hardware	16	1	16	
Rf Filters	1	60	60	



A3 2/9



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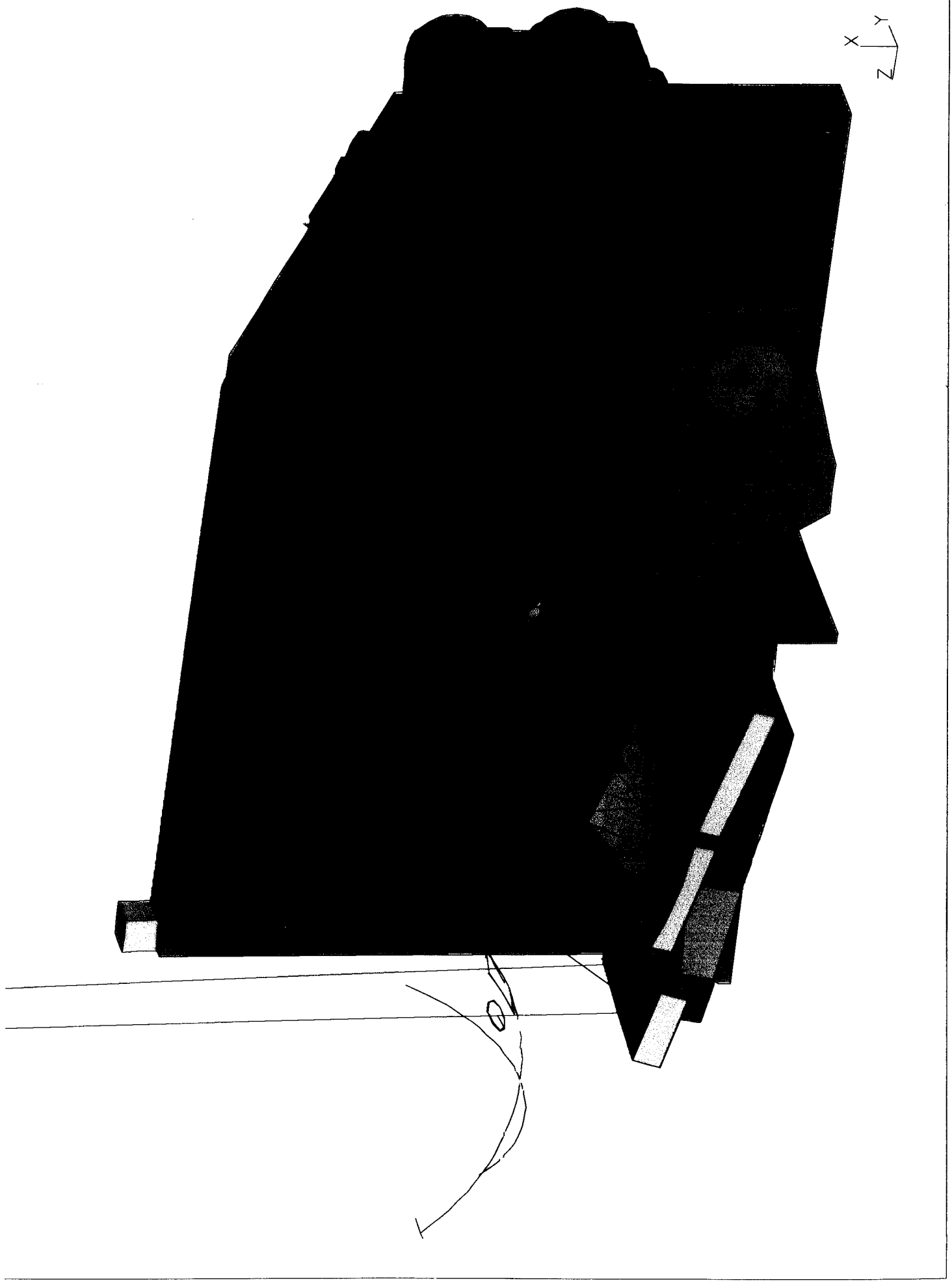

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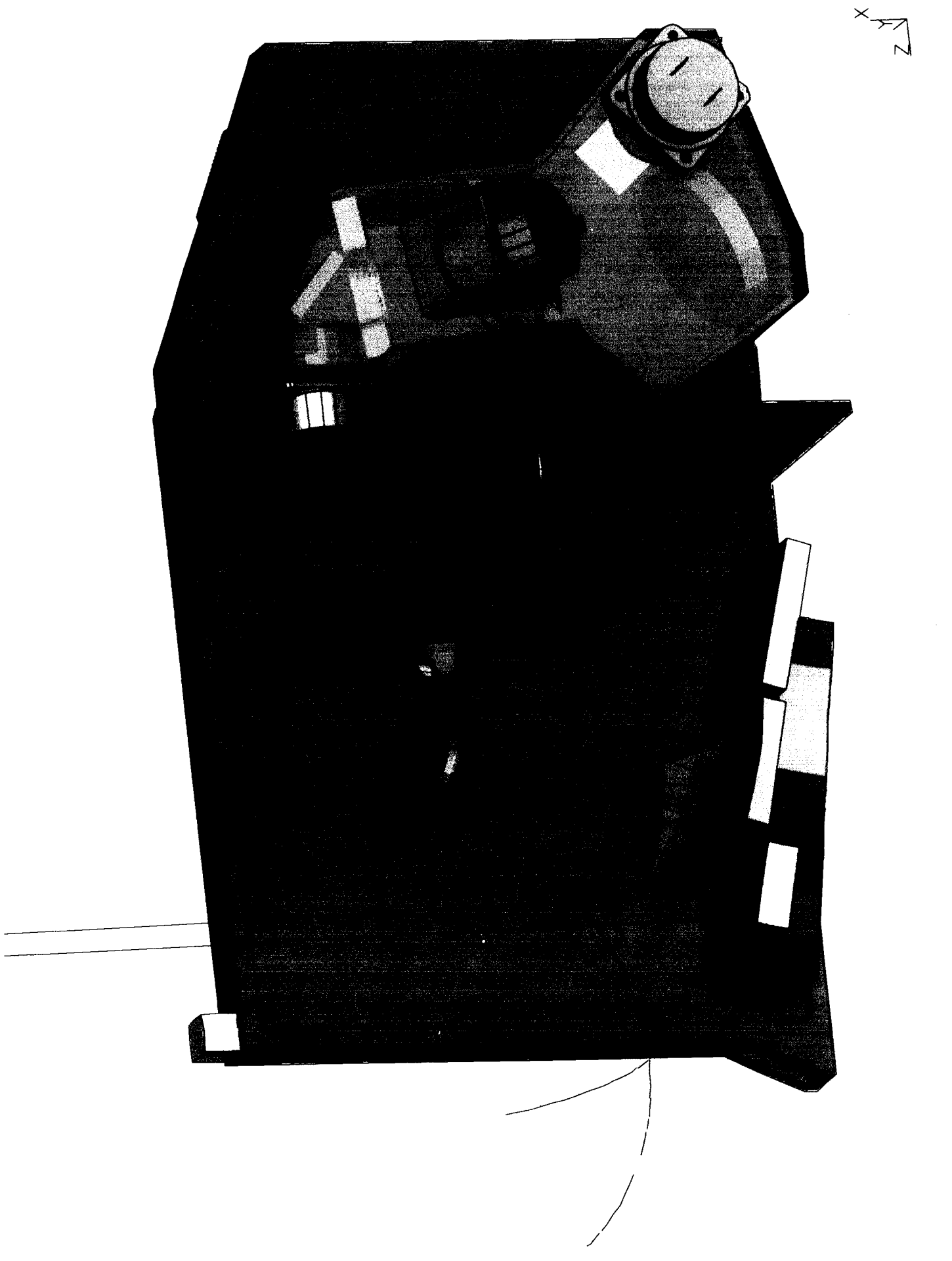

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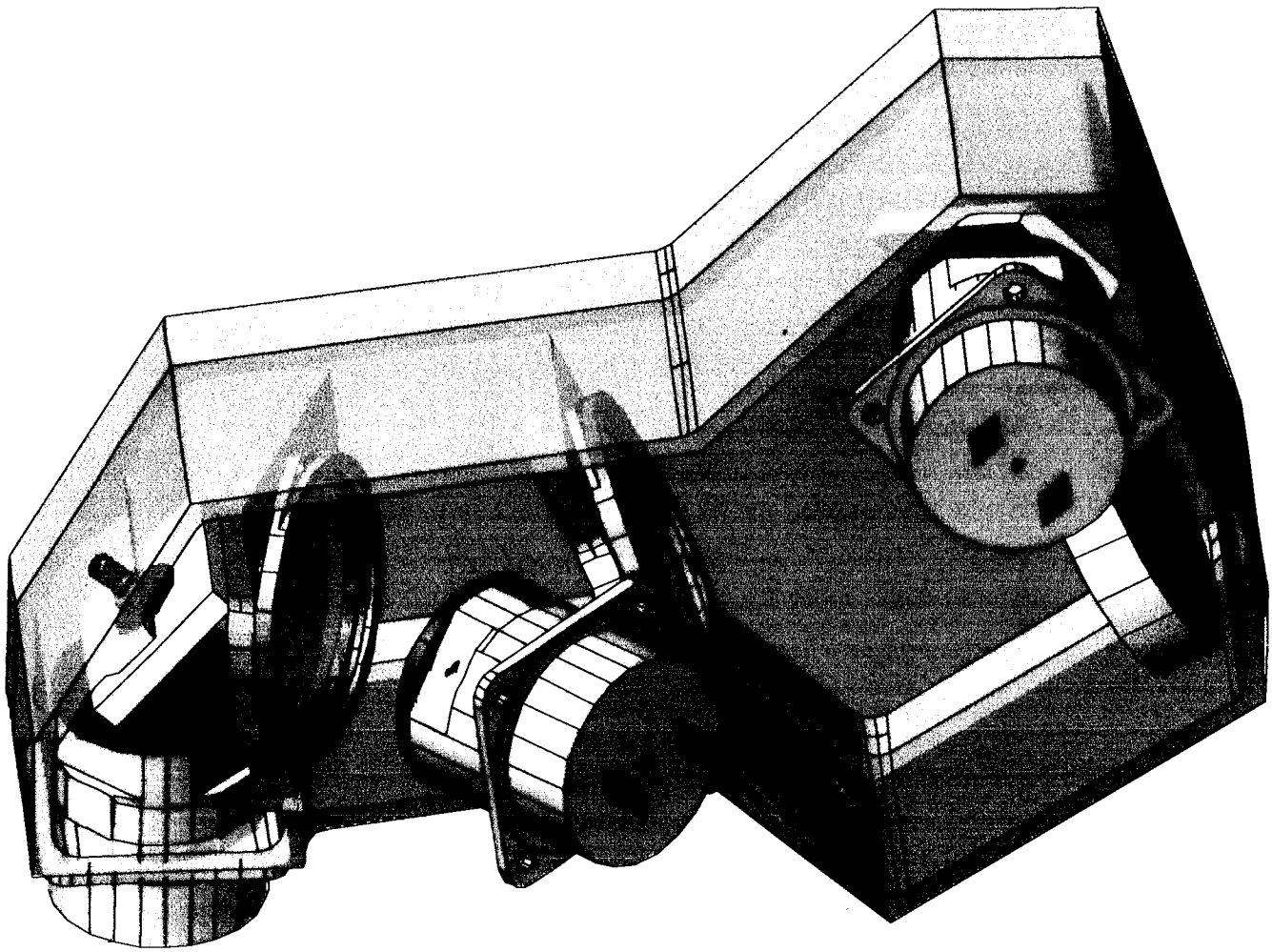

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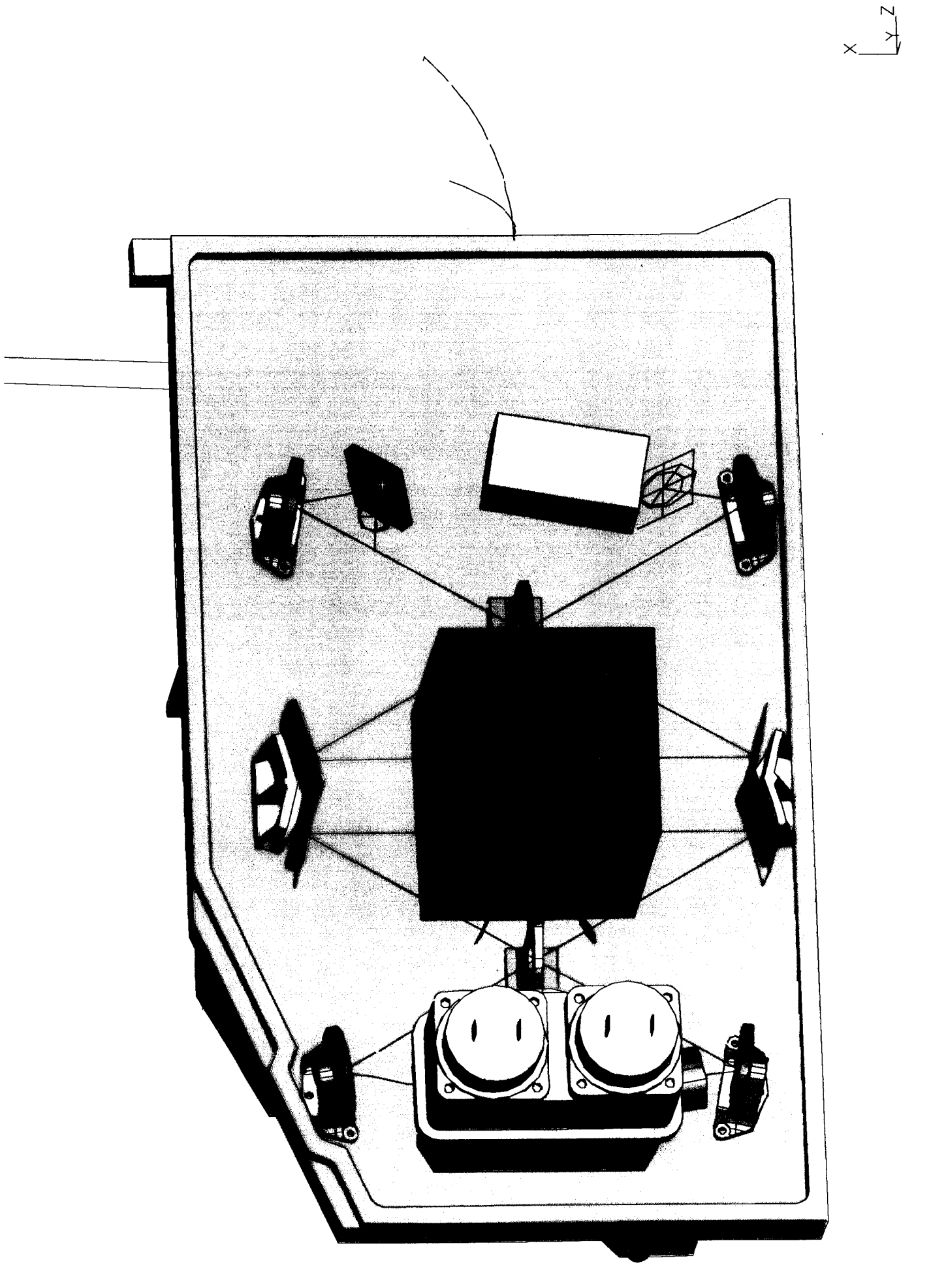

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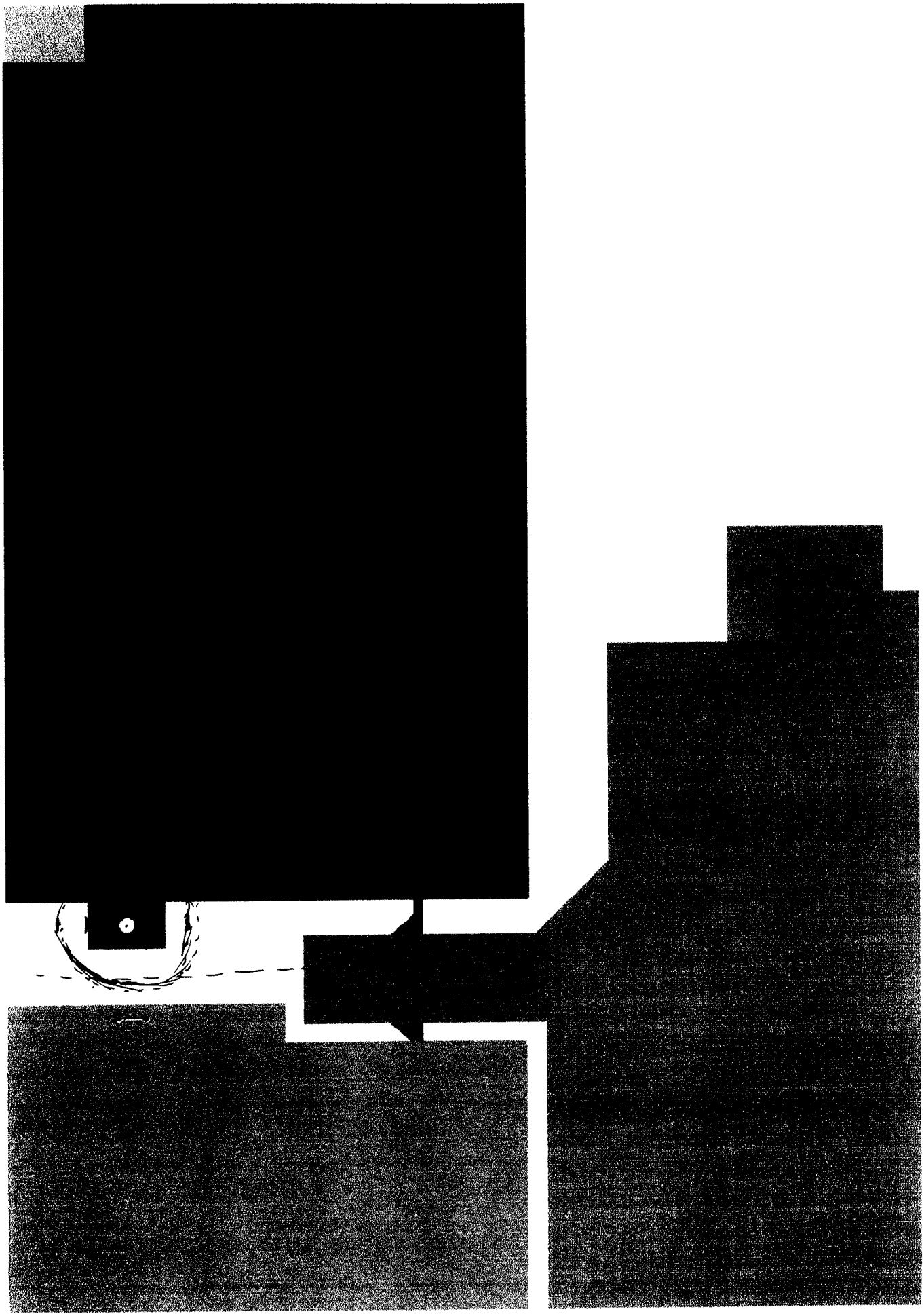

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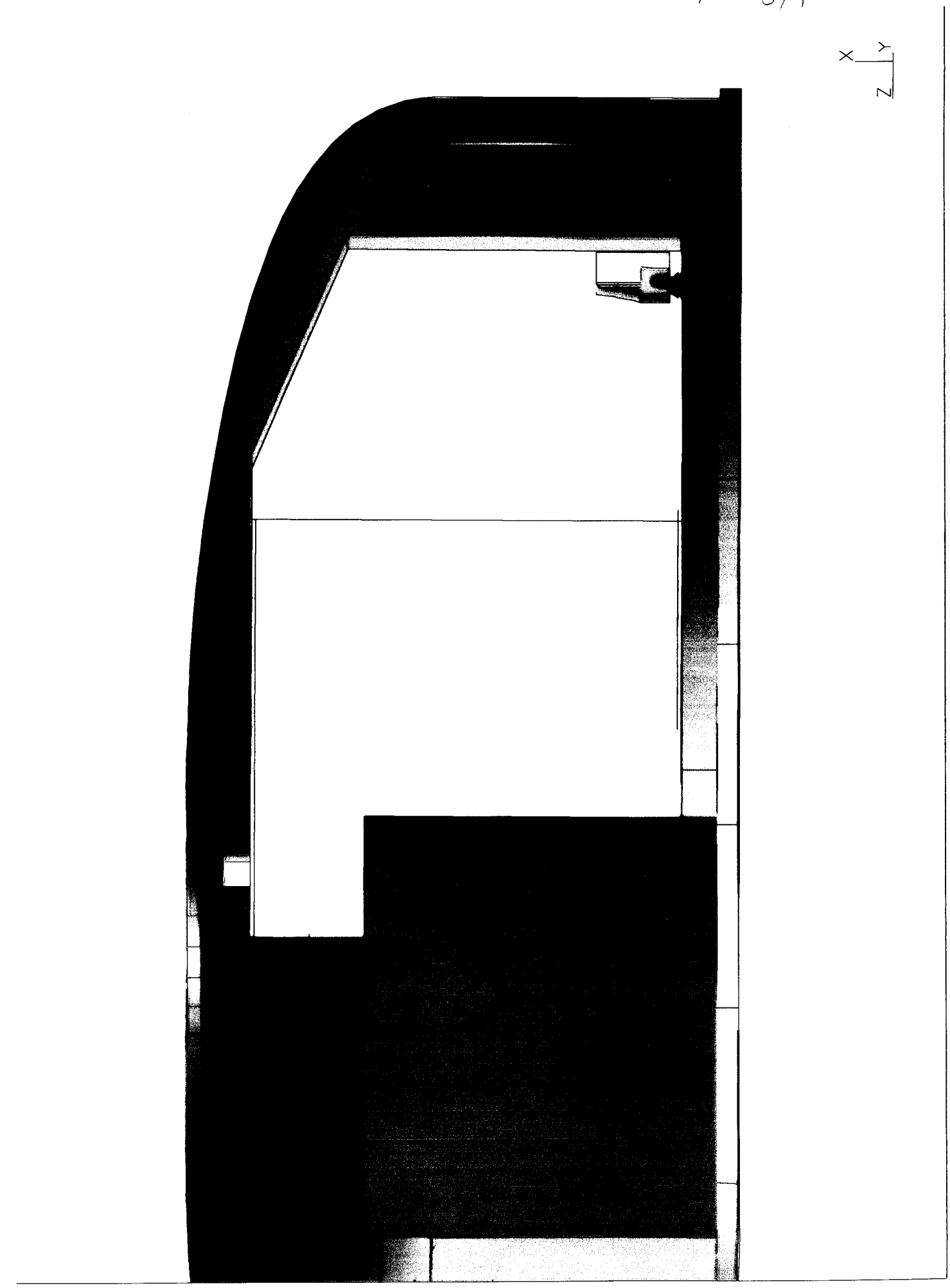

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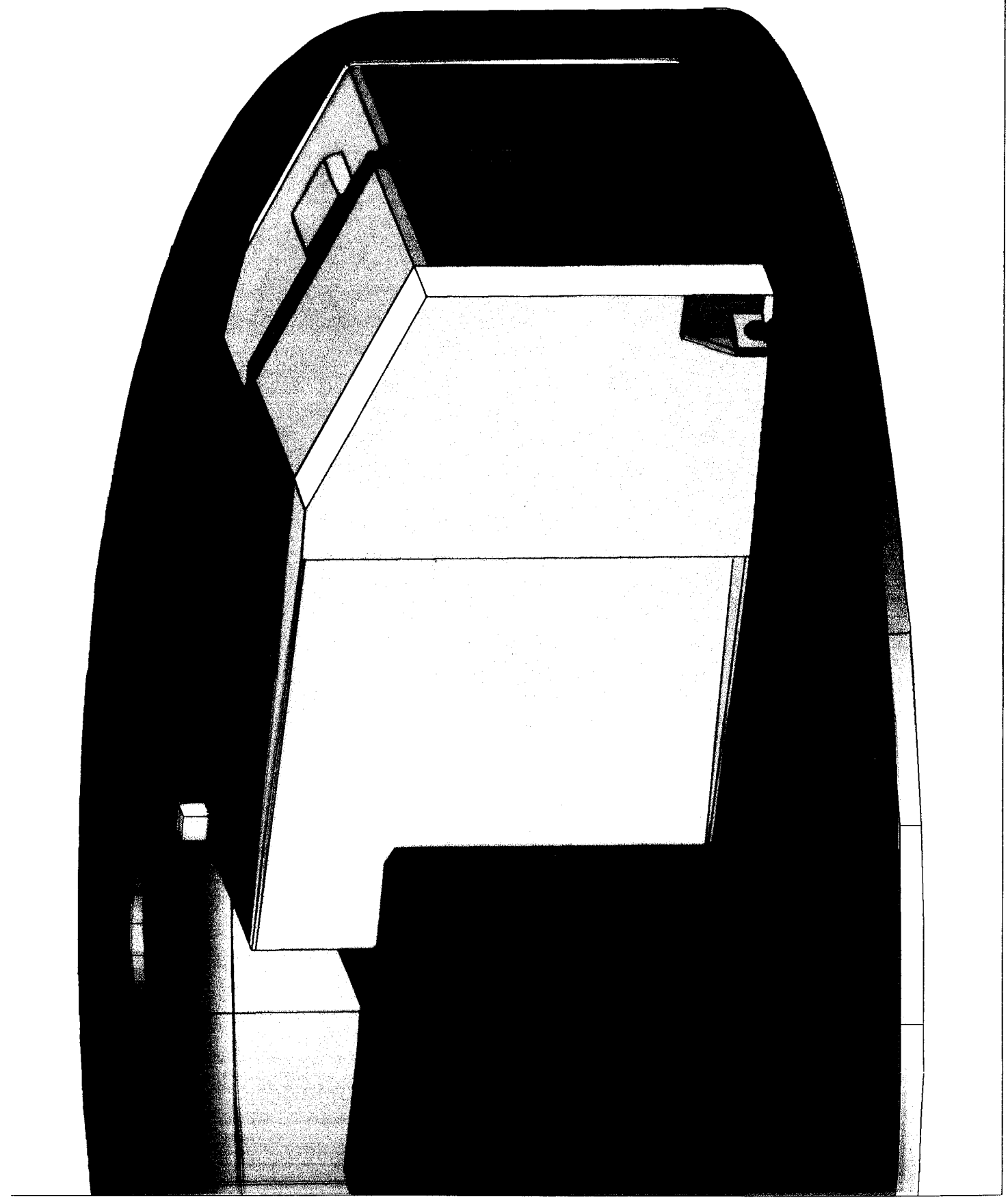

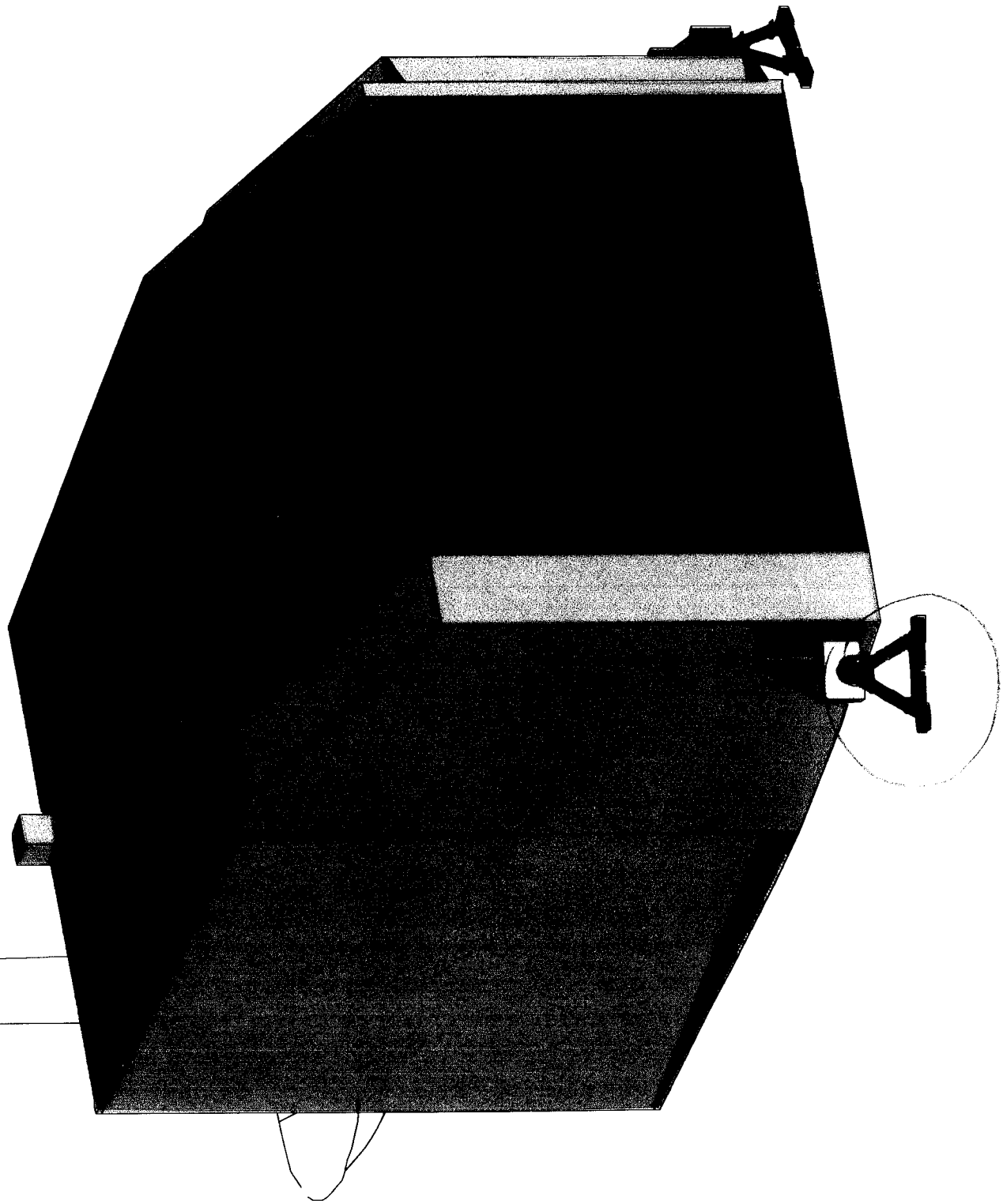
Y
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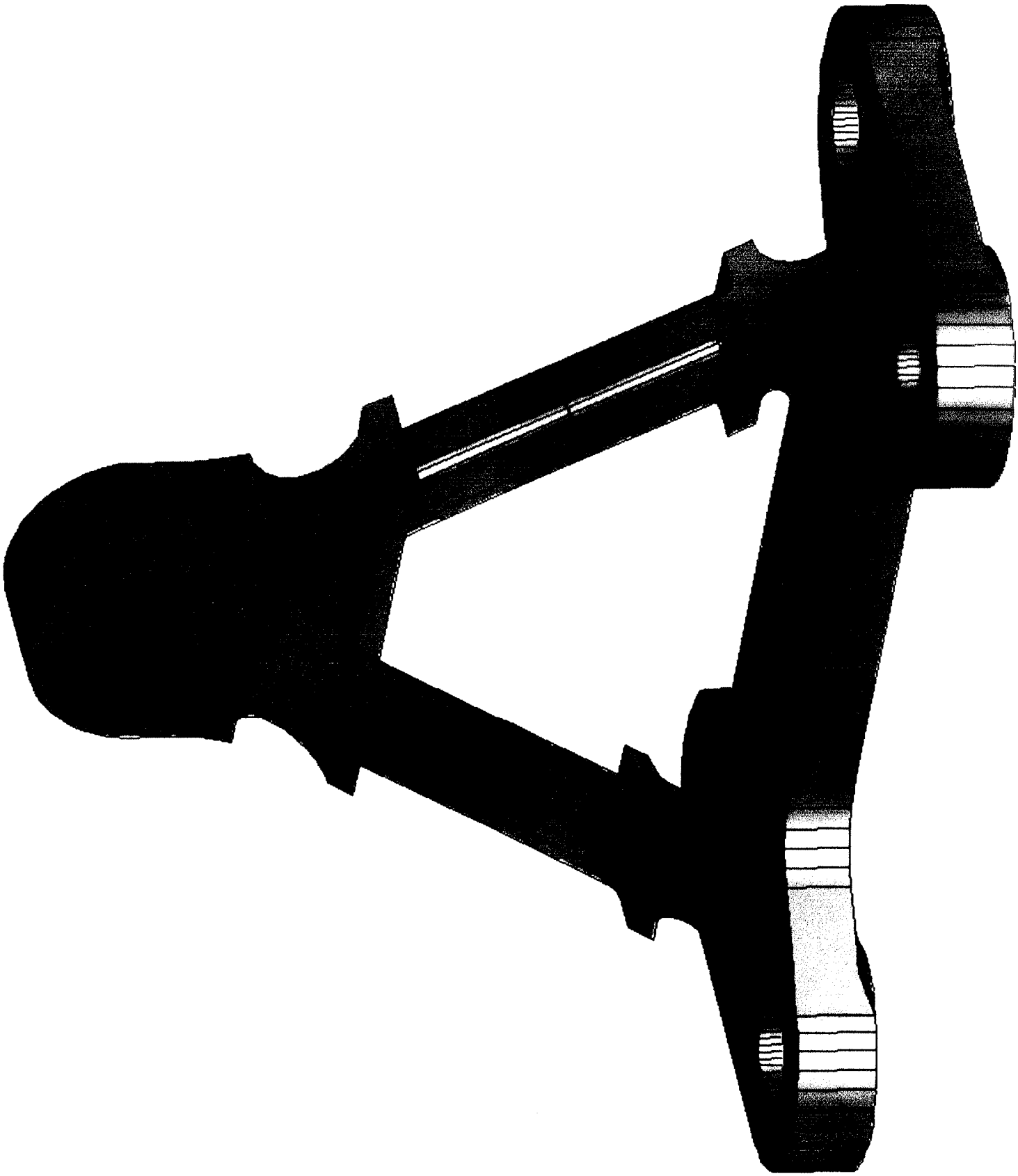
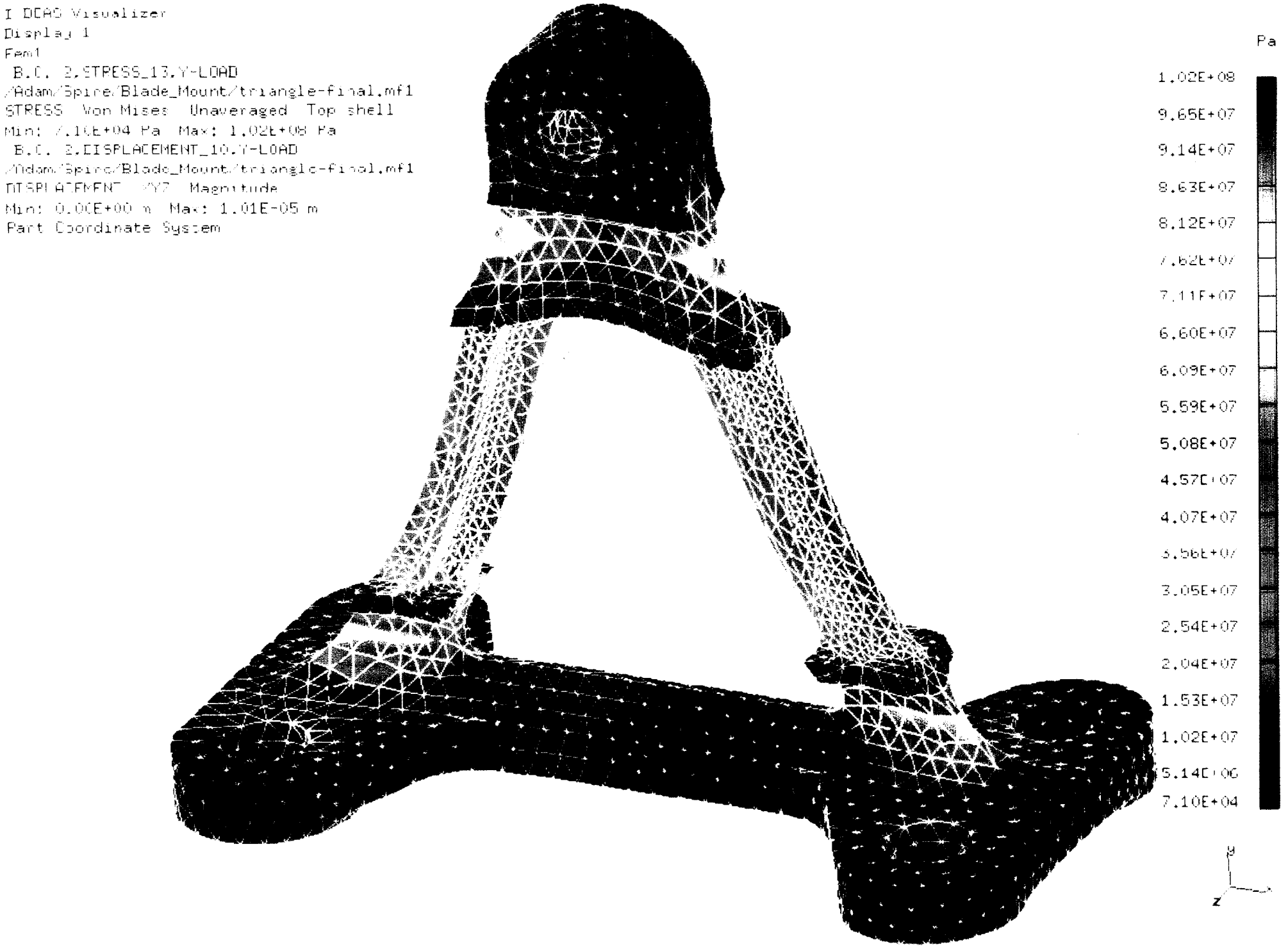
A4 2/6




I DEAS Visualizer
Display 1
Fem1
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STRESS Von Mises Unaveraged Top shell
Min: 7.16E+04 Pa Max: 1.02E+08 Pa
B.C. 2.DISPLACEMENT_10.Y-LOAD
/Adam/Spire/Blade_Mount/triangle-final.mf1
DISPLACEMENT *XYZ Magnitude
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Part Coordinate System
Pa
1.02E+08
9.65E+07
9.14E+07
8.63E+07
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7.62E+07
7.11E+07
6.60E+07
6.09E+07
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5.14E+06
7.10E+04
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A4 2/6

I DEAS Visualizer
Display 1
Femi
B.C. 1,NORMAL_MODE 1,STRESS_4
/Adam/Spire/Blade_Mount/triangle-final.mf1
STRESS Von Mises Unaveraged Top shell
Min: 1.61E+07 Pa Max: 1.67E+12 Pa
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/Adam/Spire/Blade_Mount/triangle-final.mf1
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Part Coordinate System
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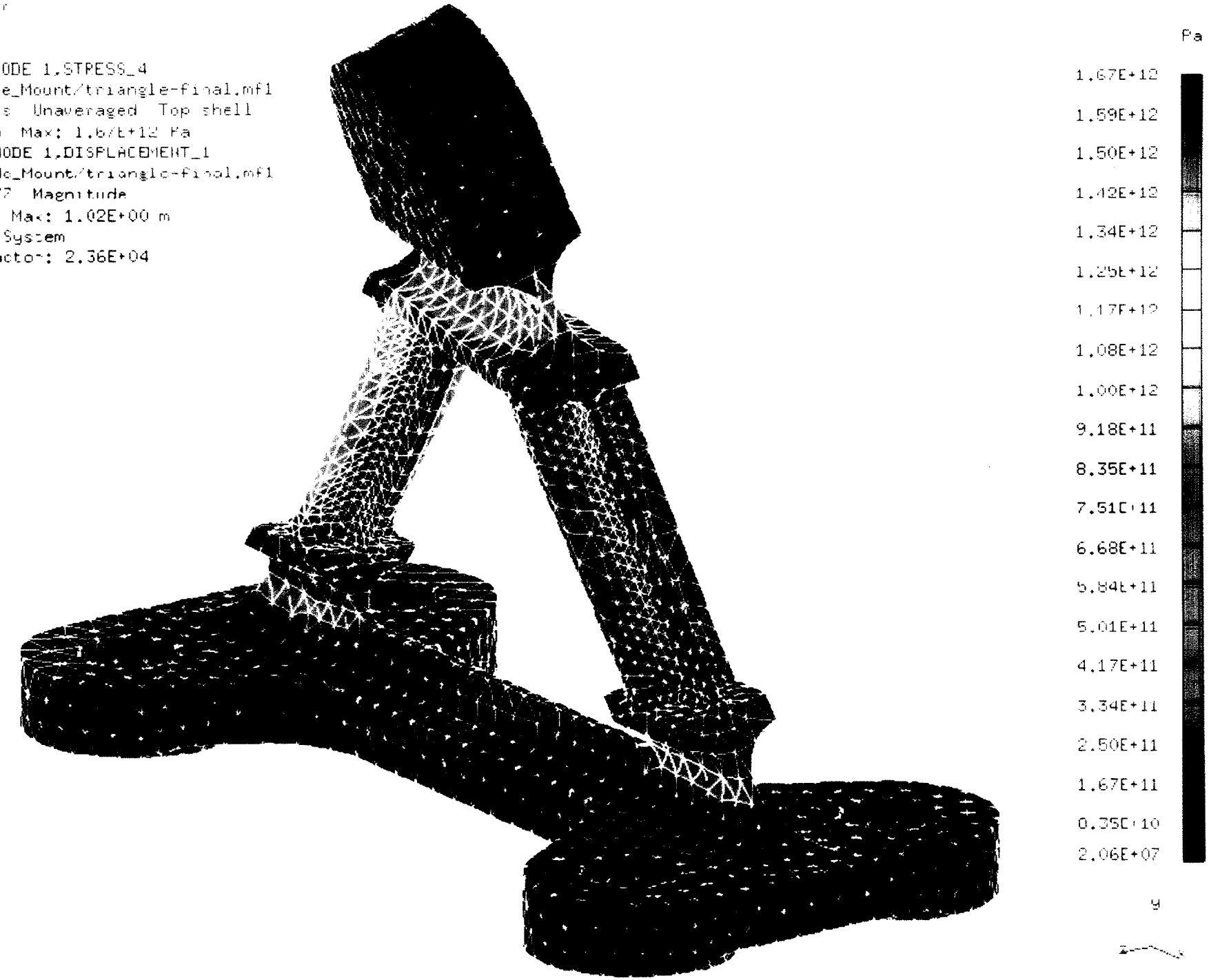

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'em1
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STRESS Von Mises Unaveraged Top shell
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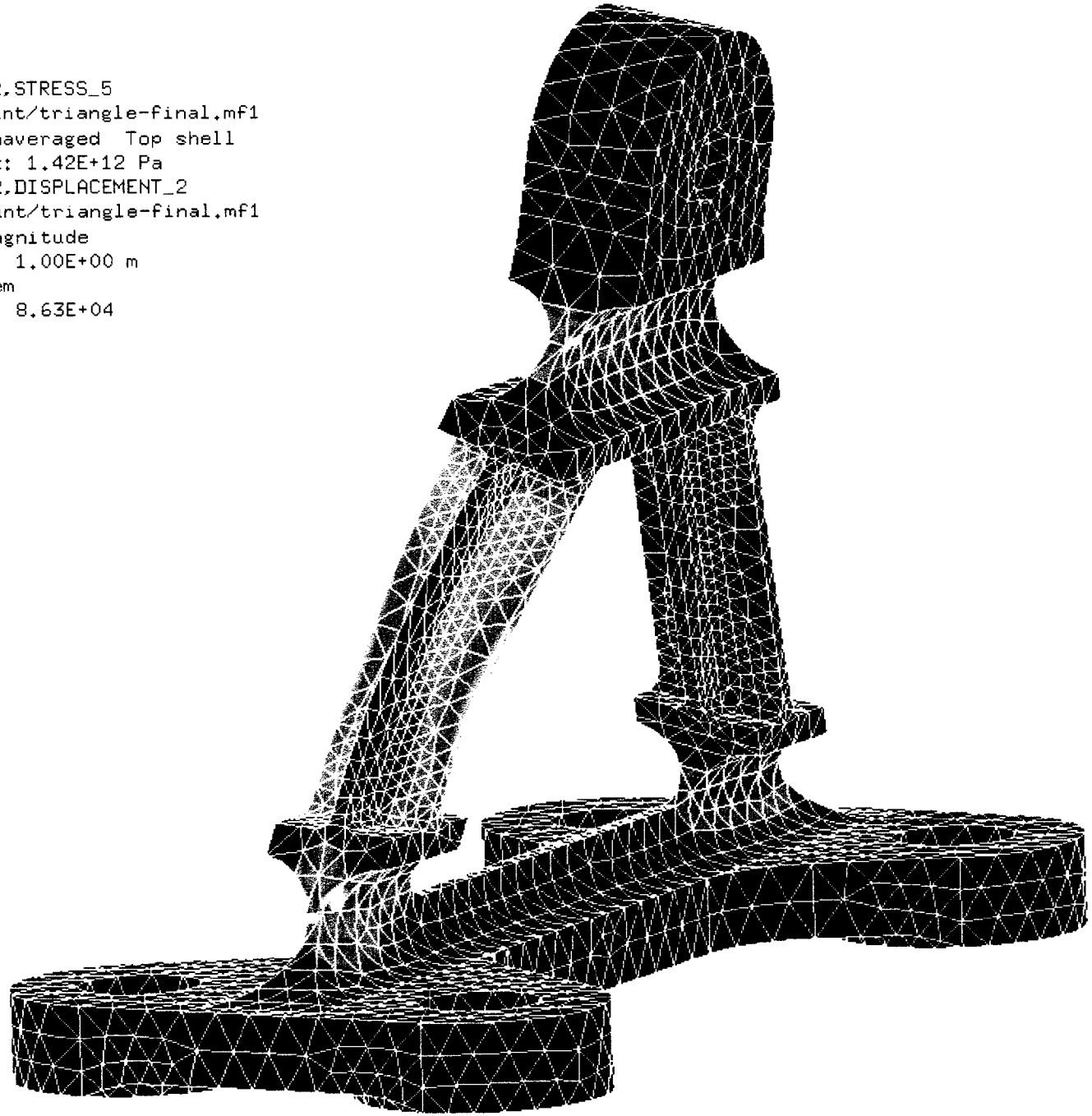

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1.35E+12
1.28E+12
1.20E+12
1.13E+12
1.06E+12
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7.09E+10
3.70E+07

y
x z

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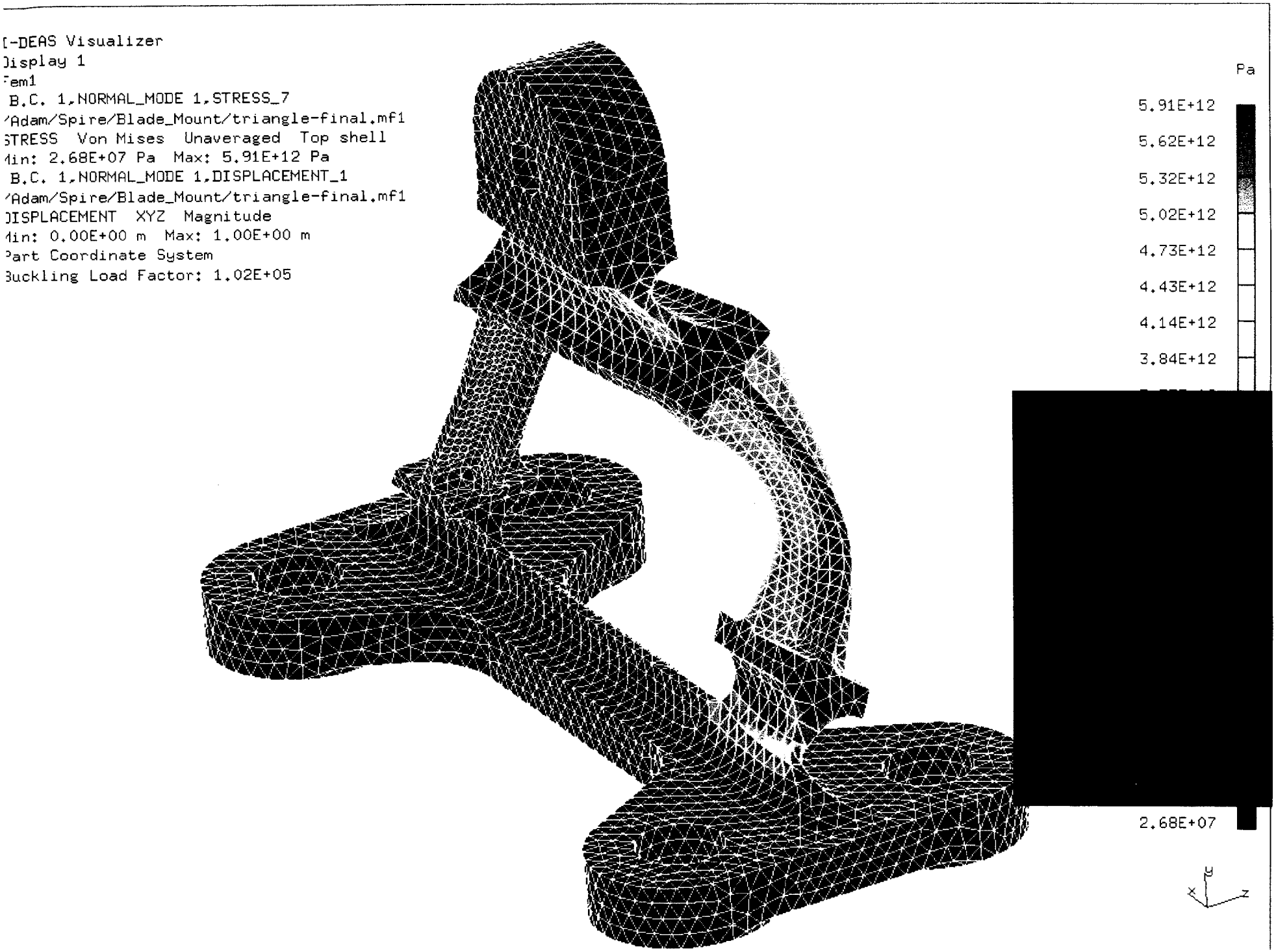
I-DEAS Visualizer
Display 1
Fem1
B.C. 1,NORMAL_MODE 1,STRESS_7
/Adam/Spire/Blade_Mount/triangle-final.mf1
STRESS Von Mises Unaveraged Top shell
Min: 2.68E+07 Pa Max: 5.91E+12 Pa
B.C. 1,NORMAL_MODE 1,DISPLACEMENT_1
/Adam/Spire/Blade_Mount/triangle-final.mf1
DISPLACEMENT XYZ Magnitude
Min: 0.00E+00 m Max: 1.00E+00 m
Part Coordinate System
Buckling Load Factor: 1.02E+05
Pa
5.91E+12
5.62E+12
5.32E+12
5.02E+12
4.73E+12
4.43E+12
4.14E+12
3.84E+12
2.68E+07
Y
X
Z

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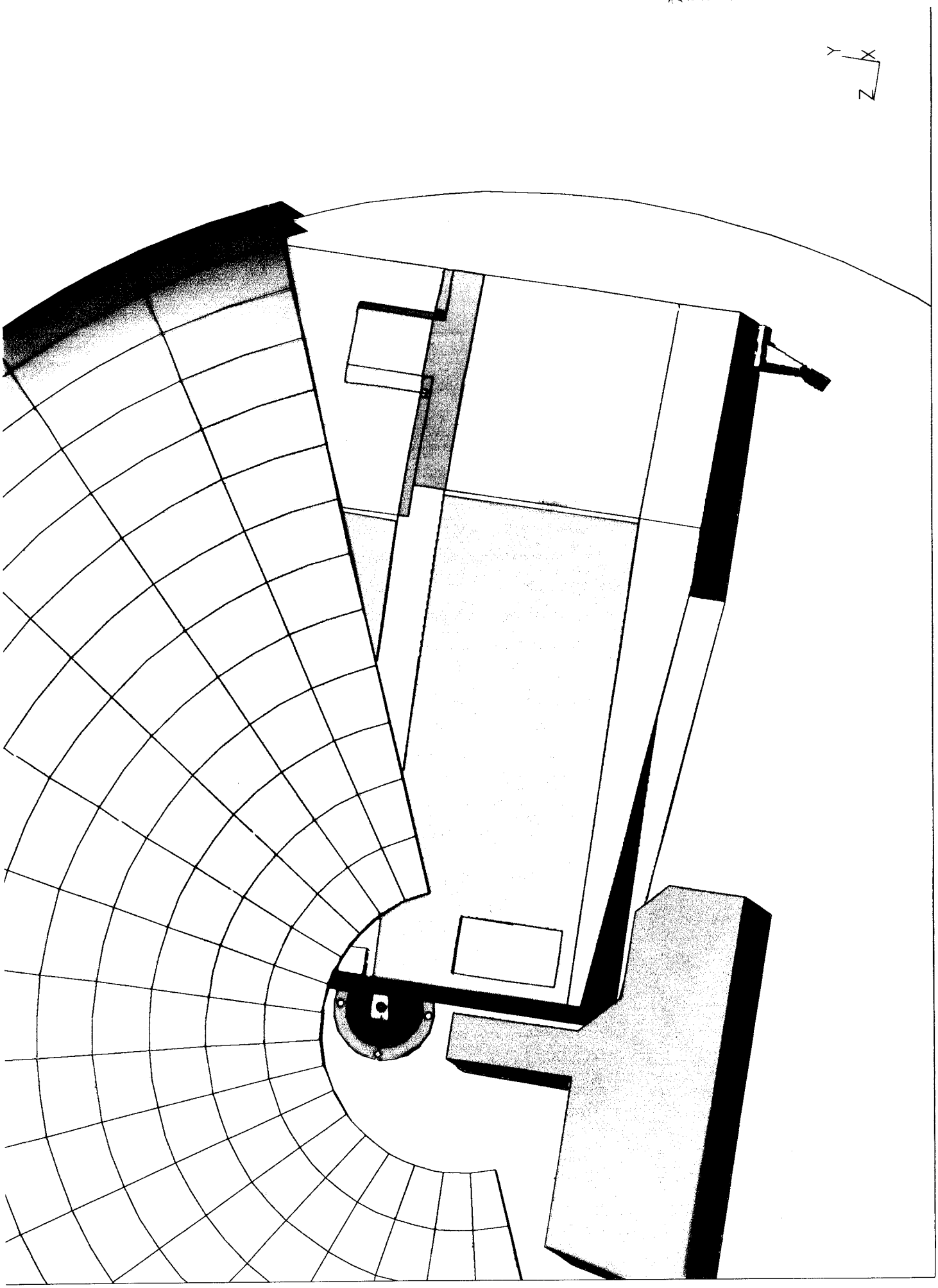

Ken, please find below some comments to those inputs from your side to IID-A we have not considered (fully). The comments from your list not given below are reflected in the update.

SPIRE Comments on IID-A 7 March 2000

Chapter 7.

Section 7.2.1.2 First Para. – we note the need for "instrument dummies" for the STM. We assume that the instrument groups do not need to provide these as they are not listed as deliverables – is this correct?

Response: Yes, I expect these models being delivered by the Prime

Section 7.2.1.2 para on "Closure of Optical Bench". Whilst the straylight test given here is useful to check for any gross errors it is not a sufficient test to ensure compliance with the straylight requirements in the FIR. FIR radiation is more difficult to baffle against than optical and this test does not include the effects of self emission from the cryostat shields/wiring etc inside the final enclosure.

Response: Agreed

Section 7.3.3. We note that ESA requires the "cryogenic GSE" for the alignment verification of the optical bench (both warm and cold). We also note that there is provision for real alignment (as opposed to only alignment verification) of the optical bench using the cryostat support struts.

Response: Yes, there is provision for real alignment.

Section 7.3.4: The sequence of integration appears confused here – when is the telescope actually placed on and aligned. And how is it aligned if the cryostat has already been filled? The cryogenic GSE as sketched in the cryostat interface study report will not go on when the telescope is in place. The telescope alignment therefore has to be done with the cryostat warm and at ambient pressure – this all needs to be discussed and verified by the Alignment Working group as it is not clear that this will fully verify the telescope to optical bench (and to instruments) alignment correctly.

Response: Correct, please clarify in the alignment WG.

Chapter 9

To systematically verify the instrument status against each requirement in the IID (A&B) we need the requirements to be identified by a unique reference number and be separate from the general explanatory text. Sometime it is hard to distinguish between the two. We suggest an appendix is added with the complete set of requirements identified.

Response: Comment not yet considered for the update.

Models – general - What form do the deliverable mathematical models need to be in – what software is envisaged for each of the deliverable models? There are TBDs all through this section. We are defining models in a variety of packages and it will be very expensive in time and money to change from the packages we are familiar with.

Response: Use of models from your packages need to be agreed upon on a case by case basis (to be evaluated w.r.t. possibility of transfer of models)

Section 9.2.2.1: We are concerned that the requirements here cannot be met. To verify all electrical interfaces with the S/C implies we need to provide a DPU and a DRCU (both have interfaces to the Power Distribution System). To provide for verification of the instrument functional performance would then require a very sophisticated analogue simulator of the FPU. This would also have to include possibilities to change the performance characteristics of the mechanisms to allow qualification of the on-board software (autonomy functions). We had planned to provide a simulator of the FPU and DRCU as a unit which would allow the interface and operations interfaces to the CDMS to be verified, but this would not verify the PDU I/F.

Response: See fax SCI-PT/FINS-07592

Section 9.4.1.2 The NASTRAN code is not available to MSSL, we can export the model in NASTRAN format if needed. The analysis will not be performed in NASTRAN.

Response: NASTRAN format is needed (transfer to be evaluated asap)

Section 9.4.1.2 There is no need for an acoustic noise test for SPIRE, the cryostat provides for a vacuum environment. We have not taken a shock analysis into account.

Response: Shock level will come

Section 9.4.1.3 Limit loads are quasi static? The accelerations will be considered separately, no load combination.

Response: You have to combine loads in worst case

Section 9.4.1.3 The section is formulated open ended. Please state clear requirements with respect to frequency requirements. Allowed uncertainty.

Response: Will be changed in the next update

Section 9.5.3.1 Is tightly balanced required? We do not think it is, please remove the requirements related to this, that is tight CoG and MoI requirements.

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Response: Requirement under review for FIRST

Section 9.5.3.7 The shock test has not been foreseen, is it really required. This requirement can have a significant impact on the I/F loads and may induce redesign. If it is required please specify as soon as possible.

Response: Will be defined

Section 9.5.5.2: We cannot meet the first two requirements - for example:

a. During system-level tests the FTS mechanism will be operated in an orientation which will mean the drive is operating against gravity and the power dissipation will be outside the normal range.
b. The cooler requires the instrument to be a certain attitude during its operation.

Response: Agreed, should be agreed upon formally (IID-B)

Chapter 10:

Section 10: The PI will not adhere to the contents of this section just because ESA have financial limits imposed. The PI also has to work under such constraints and therefore the project management should follow a scheme aimed at minimising the overall cost for all parties.

Response: I do not fully understand your comment.

Section 10.8.2: The section on reviews needs to be updated to reflect the fax (PT-06700) of 29th April - if this is still the current view.

Response: Update, reflecting the change in the ITT preparation and start of phase B is under preparation