

ACIS Verification Summary Report

Specification:	AXAF Observatory to Science Instrument ICD (IF1-20)
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Requirement Number/Title:	3.3.1.1.1.3 ACIS DA Thermal Interfaces (VRSD 3.3.1.1.1.3)
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Requirement Statement:	Total thermal conductance between the detector and translation table shall be assumed to be ≤ 0.05 Watts/ $^{\circ}$ C, as provided by the collimator.
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Verification Method:	Analysis
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Procedure Number:	N/A
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Configuration:	ACIS Detector Installed in ISIM
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Cycle Time:	N/A
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Verification Discussion/Results:

The ACIS Mid-Term Review Presentation Package from November 29, 1995 documents the hot case (Attachment 1) results with the ISIM at 0° C. For this condition, the focal plane detector was predicted to be -130.4° C with a total heat load of 1.7 Watts. The thermal conductance between the focal plane detector and the ISIM can therefore be calculated to be 1.7 Watts divided by 130.4° C which equals .013 Watts/ $^{\circ}$ C. This verifies compliance with paragraph 3.3.1.1.1.3 since the conductance is .013 Watts/ $^{\circ}$ C which is ≤ 0.05 Watts/ $^{\circ}$ C as required.

Neil W. Lee

 ACIS Cognizant Engineer

5/27/97

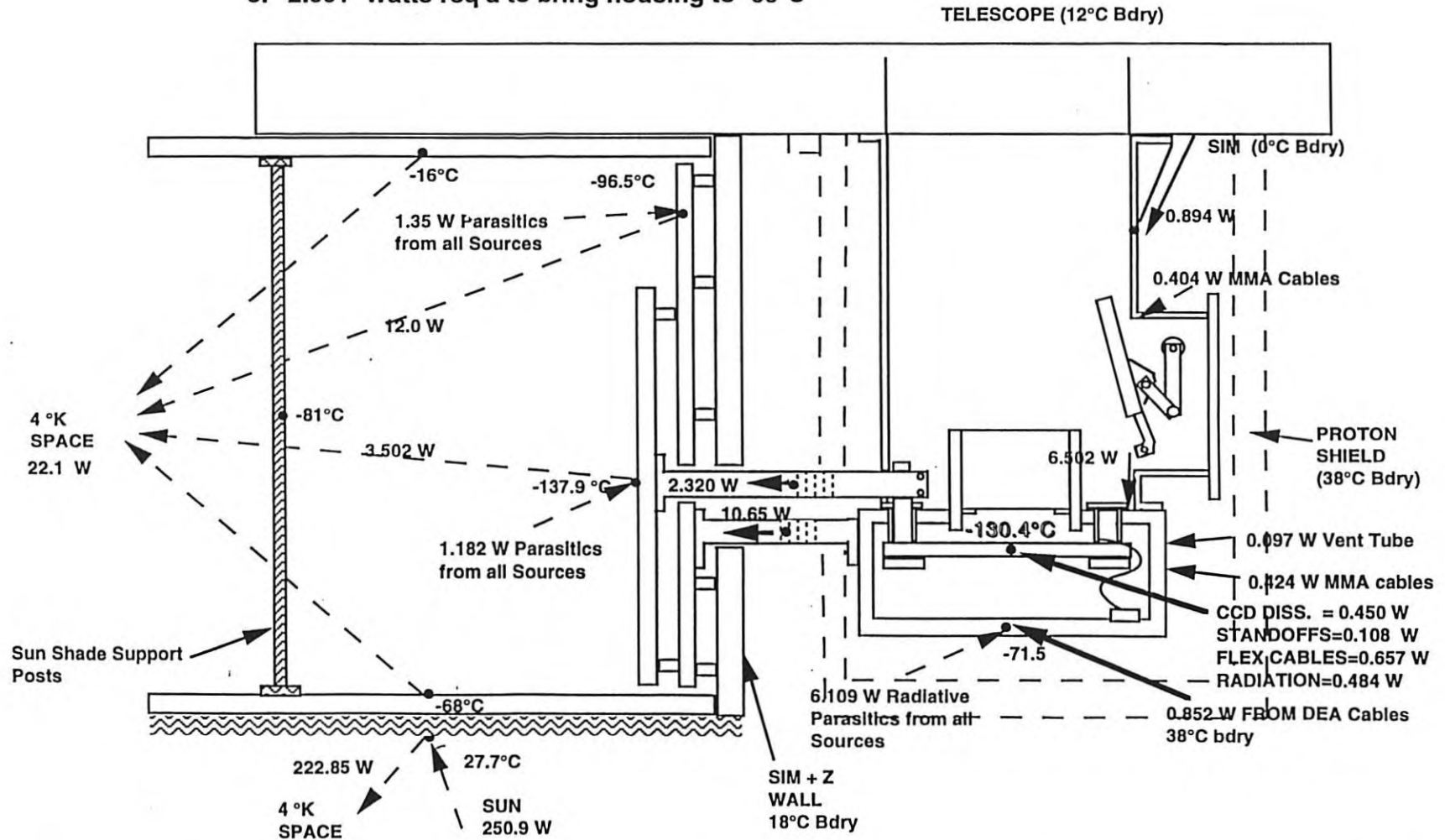
 Date

ACIS Hot Case Analysis Results



Note:

1. Temps and Qmaps with no Heater Power
2. 0.70 Watts to bring focal plane to -120°C
3. 2.991 Watts req'd to bring housing to -60°C



Attachment A-5 1 - Verification Report 36-01520.013 PAGE 2

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Specification:	AXAF Observatory to Science Instrument ICD (IF1-20)
Requirement Number/Title:	3.3.1.1.1.1.3 ACIS DA Thermal Interfaces (VRSD 3.3.1.1.1.1.3)
Requirement Statement: Total thermal conductance between the detector and translation table shall be assumed to be ≤ 0.05 Watts/ $^{\circ}$ C, as provided by the collimator.	
Verification Method:	Analysis
Procedure Number: N/A	
Configuration: ACIS Detector Installed in ISIM	
Cycle Time: N/A	
Verification Discussion/Results:	
<p>This is the second submittal for the verification of this requirement. The first submittal answered the requirement erroneously because of a misinterpretation of the requirement. The following rationale correctly answers the requirements.</p> <p>The original CDA model assumed a conductance of $.02$ W/$^{\circ}$C per attach point or a total of $.06$ W/$^{\circ}$C for the three mounting feet. This conservative value exceeded the value specified in the requirement. However since that time, the models have been refined for the actual cross-sections and material properties for the collimator. The current value, which is also in the thermal math model provided to the ISIM contractor, uses $.050$ W/$^{\circ}$C with the collimator at 20°C (Hot Case) and $.043$ W/$^{\circ}$C (Cold Case) with the collimator at -60°C. Temperature dependent material properties account for the differences in conductance between hot and cold case. Since both of these conductances are less than $.05$ W/$^{\circ}$C, the requirements of paragraph 3.3.1.1.1.1.3 have been met and no further action is required.</p>	

Neil W. Jice
 ACIS Cognizant Engineer

6/19/97
 Date

Element:

ICD/ACIS

Requirement Number:

3.3.1.1.1.3

Verification Item:

3.3.1.1.1.3

Requirement Title:

Thermal Analysis Constraint

**AXAF-I
Verification
Requirement
Compliance Data
Submittal**

Evaluators:

THRM

Type of Review:

- Verification Item Closure
 Requirement Closure

Compliance Date/Location:

MA-208/38.01520.013/Bldg 4200 Rm 522 (Closure Report)

Verification Method

Validation of Records

Comments:

The Verification Summary Report (38-01520.013) states that the requirement is met by calculating focal plane heat loss to ISIM. I interpret the requirement to be specifically the Interface conductance between the ACIS collimator and the SIM translation table. A review of the CDA thermal math model reveals that the linear conduction assumed between the collimator and the translation table to be ~0.02 W/C per attach point (or 0.08 W/C total), which is greater than the 0.05 W/C requirement. However, the analysis should take the most conservative number within the specification which would be assuming 0.05 W/C. Anything higher is only more conservative.

6/23/97 - Updated response received by LMAC. The 0.05 number is outdated. The current ISIM modelling has the most up-to-date calculation of the ACIS collimator to Translation Table thermal conductance. The range is 0.05 W/C for hot case to 0.043 W/C for cold case. By letter of the law, the cold case should use 0.05 W/C, but since ICD is outdated and both "sides" of interface (i.e., BASD and LMAC) are using same numbers, I am approving this verification item.

Status

Open 5/30/97 due 6/27/97

Recommendation:

- Approve
 Disapprove
 Other (Explain)

Action Required for Closure:

Approved based on 38-01520.013 Revision A

MSFC Evaluator:

John Sharp

Date:

6/16/97

Organization:

NASA/MSFC/ED83

Phone Number:

205-544-5158

Disposition:

- Approve
 Disapprove
 Other (Explain)

Action Required for Closure:

I agree with John in that if all parties agree with the cold case conductance at 0.043, then that is what we should do. However, we should get a PIRN out to correct the ICD.

Chief Engineer:

Anthony R. Lavole

Date:

6/25/97