CR–206887

Massachusetts Institute of Technology

Center For Space Research
Cambridge MA

Room NE80-6073 Ph: 617-253-7552 Fax: 617-253-8084

Gus Comeyne
NASA/Goddard Space Flight Center
Astro-E/Integral Mission Manager
International Projects, Code 404
Building 6, Room S133B
Greenbelt, Maryland 20771

March 5, 1998

Dear Sir:

Enclosed please find 5 summary Progress Report for the period ending February, 1998 on contract NAS5-32929, ASTRO-E. This report is required by item 10 of section F.1 of the contract. Please distribute 4 of these reports as called for in section C.2 (as directed in section F.1) to:

1 copy	Contracting Officer	Mail Code 284.5
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Very truly yours,

William F. Mayer

William F. Mayer
Associate Director, CSR

Progress Report - MIT-CSR XIS Project

Contract NAS5-32929
Period Ending February 28, 1998

Flight Electrical System Design

The Critical Design Review was conducted at MIT January 12-14 1998 at MIT. Details of the CDR can be found in the presentation material (copies were provided to GSFC via Gus Comeyne at the review). In summary, the design was judged to be acceptable to proceed to flight build, with some provisions associated with the design of the sensor assembly (See details later in this report). Some of the review materials, along with the action list can be seen at:

`http://acis.mit.edu/syseng/astroe/pages/docs_home.html`

All Engineering Model 2 (EM2) design details were completed and successfully tested. The necessary number of additional circuit boards and mechanical items were fabricated in order to upgrade existing engineering test beds (both here and in Japan) to the new configuration and to create new test beds for the MIT Detector Calibration Lab. The Japanese system upgrade was accomplished in mid February along with the delivery of the 1st calibration lab system. The 2nd calibration lab system will be delivered during the 1st week in March and the 3rd near the end of March (The 1st two systems being the primary units). Details of the Japanese upgrade can be found in the attached trip report.

For the most part, the project is now heavily into the flight fabrication cycle, with just a few lingering design details being carried forward.

Controller Board - Flight board layout and routing is complete. The new artwork has been produced and has been sent out to IMI for fabrication (IMI was selected as the vendor of choice for the fabrication of the raw flight boards). The boards are scheduled to be delivered in mid March and will be assembled here at MIT.

Backplane - Since there was no design changes to the backplane. The artwork from the engineering build will be used to fabricate the flight boards. The artwork will go to IMI mid-march.

Driver Board - Flight board final layout and routing is scheduled to begin the 2nd week in March. It is expected that this layout should be completed within a week.

Video Board - The schematics for this board will be delivered to Winter Design for board layout and routing at the same time as the Driver Board, so that work on it can begin as soon as the Driver Board is completed. It is expected that this board is a two week relayout, as it is our most densely populated board.

TCE Board - Finally, the TCE board will go in for layout and routing after the video board. This is not a very complex board and is tested somewhat independently of the other four boards, so it will be the last one scheduled.

CCD - An additional mechanical model was fabricated to support additional testing required as a result of problems encountered meeting the shock environment specification. The 1st flight candidate detector delivery was scheduled for delivery from MIT-LL to MIT-CSR mid February, but a problem in one of the final fabrication stages (the bond pull test station) damaged the device. The delivery of a new device is now scheduled for mid March and the remedy to the problem we encountered will be some additional fixturing at

the station. As a side note, flexprints from the flight lot were sent out for independent analysis by Hi-Rel and the consensus is that they are acceptable for use.

Flight System Mechanical Design

After the Critical Design Review, only one significant design detail remained unresolved. Just prior to the CDR, a series of environmental tests were conducted on the mechanical engineering models of both the sensor base and the electronics box assembly. A failure during the sensor base shock test indicated that the current design would not assure that the thermal electric coolers (TECs) would not be damaged during launch. A review of the shock requirement by NEC did not provide any relief from the specified levels, so a new design was proposed at the CDR. Since then, further review of the new design indicated that there still may be a problem, so the design was further modified and will be tested in early March. The nature of this design work is how to hold the detector in place during launch, without introducing an unacceptably high additional thermal load into the detector. The detector itself is not adversely affected by this motion, but the thermal electric coolers that the detector is rigidly mounted to are fairly fragile.

Long lead time items, such as the sensor body, connector plate, electronics box panels, etc. are either on order or are currently being quoted and will be placed on order during March. Small mechanical pieces and assembly fixturing are being fabricated in our machine shop at this time.

Ground Support Equipment

The core software utilities for engineering are complete and the additional tools for the Calibration Lab to operate the XIS instrument are also complete. The software under development now is the long and short form test scripts needed to streamline performance verification of the engineering and flight units up thru spacecraft integration.

The EGSE hardware is currently designed and being fabricated. A total of 6 units is scheduled to be assembled, with all the material in-house and fabrication and test activity spread out between now and June.

The drawings for the Shipping containers are in progress and quotes for the outer shells have been received. POs for the shells will be placed in March and fabrication/assembly of support structures is planned for May.

Miscellaneous

Meetings

The only formal meeting was the Critical Design Review at MIT January 12-14 1998.

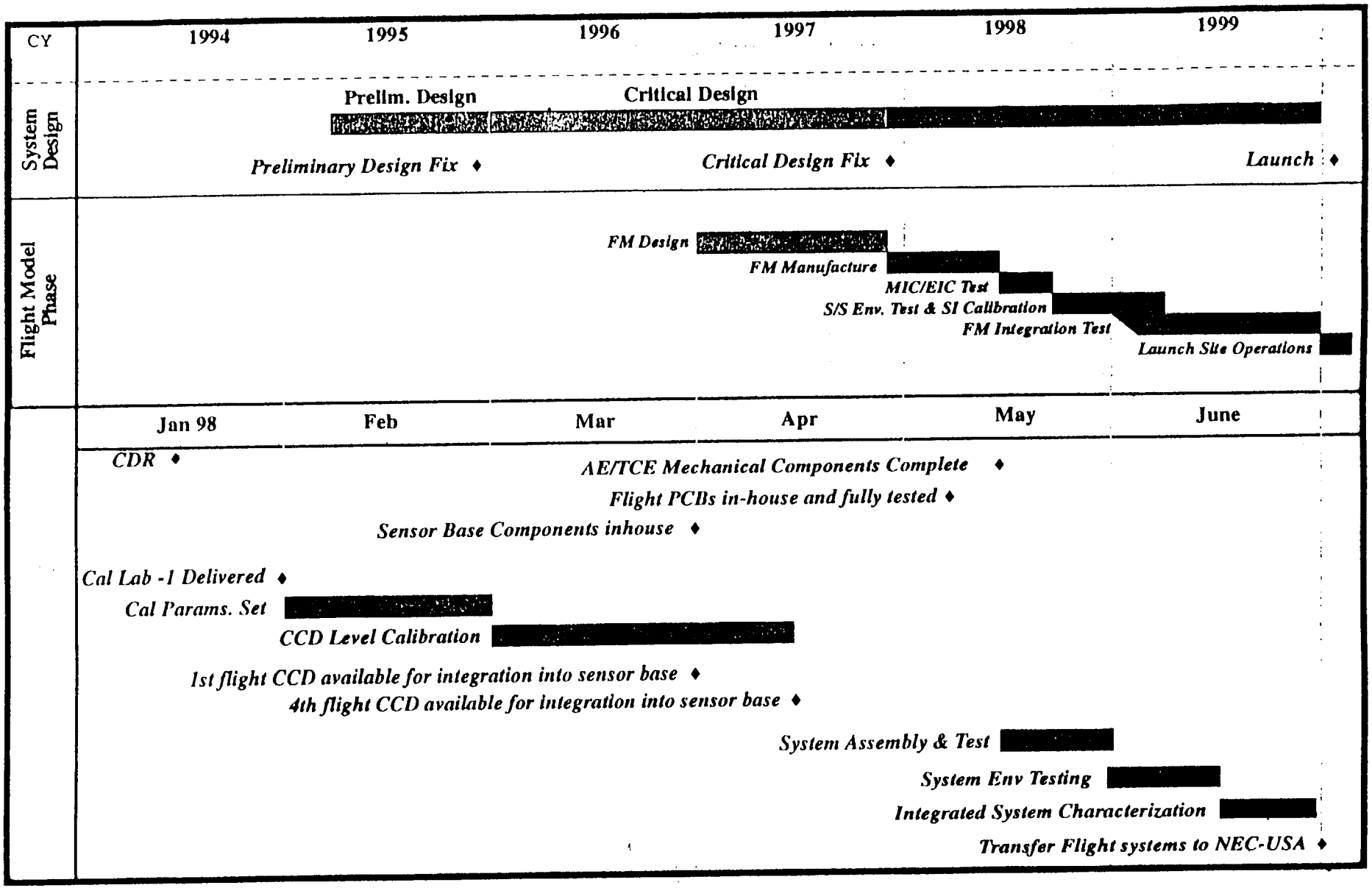
Upcoming Meetings

SWG/XIS Team Meeting in Honolulu ... March 10-13 1998

Communications with GSFC/NASA

- Submission of October 97 - January 98 533M Financial Reports
- Submission of October 1997 Technical Progress Report
- Trip Report - EM2 Upgrade at Osaka University
- Memo - Contract Deliverables Issues memo to Gus Comeyne
- Memo(s) - Misc. Standard Procurement Notifications

Astro-E XIS Master Schedule
(MIT)



MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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CAMBRIDGE, MASSACHUSETTS 02139-4307

mcd@space.mit.edu fax (617)253-8084
Room NE80-6047 (617)253-3571

MEMORANDUM

TO: J. Boughan, W. Mayer, R. Foster, R. Elder
FROM: Michael Doucette
DATE: February 24, 1998
SUBJECT: Trip Report - Osaka University

Upgrade of the MIT ASTRO-E XIS Instrument Analog Electronics and Thermal Control Electronics (AE/TCE) Engineering Model to Revision 2 was conducted by myself the morning of 2/16/98 at the Department of Space Science, Osaka University, Osaka Japan. The upgrade consisted of removing the top cover of the AE/TCE enclosure, swapping the Controller Board, Video Board and Driver Board and replacing the enclosure cover. The TCE Board was not replaced.

A possible interference problem between components D3 and D4 on the backplane and the Driver Board wedge lock was discovered during reassembly. It was determined that the wedge lock, although close, did not contact either component and reassembly was completed.

Extensive testing of the AE/TCE signal levels and timing using the "XIS Dummy CCD Box" began the afternoon of the 2/16 and continued through late afternoon of 2/18 at which time the AE/TCE was interfaced to the Osaka CCD. Extensive support was provided by Dr. Shunji Kitamoto and several graduate students.

The following is a summary of the anomalies found during testing:

- Bias levels were being set to "4ef0" instead of "0000". It was determined that this was not a problem as the command file being used was using the bias level for the MIT CCD.
- The Command Clock/Command Data phase (Osaka EGSE) was incorrect (i.e., the positive going edge of the clock occurs in the middle of the data bit instead of the negative going edge).
- Many housekeeping values were reported incorrect when the Command Clock/Command Data phase (see above) was corrected. The problem may be in the EGSE as the raw data was correct. The clock/data phase was returned to the incorrect phase.

- Two read commands per housekeeping byte were required and a fix was implemented allowing one byte per read command. We were asked not make any changes until the problem and possible solution was discussed with FJT.

- Some housekeeping values (IA Ø1, Ø2 and Ø3) max out at 12.8 Volts. The fix will require a voltage divider resistor change and its implementation will be negotiated with Richard Foster.

The following are highlights of the test results:

- The single-ended interface levels were well within spec.
- The RESET line pull-down modification functioned properly.
- The Dummy CCD gain and noise levels were consistent with measurements obtained at MIT.
- The Osaka CCD (high and low) gain and noise levels were very satisfactory to Osaka scientists.

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Cambridge, Massachusetts 02139

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Room 37-241 FAX 617-253-3111

Mon, Mar 2, 1998

Mr Gus Comeyne
Mail Code 404
Goddard Space Flight Center
Greenbelt, MD 20771

Dear Gus,

The purpose of this letter is to document a proposed change in the hardware deliverables to the MIT/GSFC Contract (NAS5-32929) for the MIT contribution to the XIS experiment on the Japanese ASTRO-E mission. This is the "unofficial" version - if you agree with the proposal, we will submit it through the proper contract channels.

Since the time the contract was signed in 1996, the detailed plans in Japan have matured. Both Osaka and Kyoto Universities have set up complimentary calibration systems for CCDs. Therefore, the need for MIT to supply vacuum chambers (Mechanical Ground Support Equipment) to Japan has vanished. In fact, MIT did not deliver (for loan) the vacuum chamber called out in Clause H.6 of the contract, and we propose now not to deliver the vacuum chamber called out as item #4 in Clauses B.1 and F.1. However, based on the discussions at the CDR in January, we now understand the plans of our Japanese colleagues for the calibration of the CCD detector systems and Analog Electronics (AE). It is quite apparent that a second copy of the Electrical Ground Support Equipment (EGSE) will be required in Japan in order that calibration of the flight detector assemblies and AE's can be done in parallel at both Osaka and Kyoto (each university plans to calibrate two detector assemblies and one AE for about a month, then they would swap units). Obviously, each requires an EGSE, but only one is called out in the current contract (item #1c in clause B.1). Therefore, we propose to deliver a second EGSE in June, at the same time we deliver the flight hardware. For your information, although not a contractual item, in June we also plan to update the original EGSE that was delivered last summer so that all users of an ASTRO-E system will have the same hardware/software.

Given the above, we propose the following changes to the contract:

a) Delete the second item of Clause H.6 (vacuum chamber loan).

b) Delete the current item #4 of Clauses B.1 and F.1 (vacuum chamber).

c) Add a new item #4 to Clauses B.1 and F.1 titled "Electronic Ground Support Equipment (EGSE)", with a delivery date of June 1998.

There would be no effect on the contract schedule or cost for these changes.

Please call if you have any questions about this proposal.

Sincerely,

Bill Mayer

Massachusetts Institute of Technology
Center For Space Research

MIT-XIS
General Planning Overview

Rev 1.0 - CDR Review Copy
Jan 12, 1998

Astro-e X-ray Imaging Spectrometer
Project

XIS Critical Design Review Agenda

Monday - January 12 1998

9:00AM ***Kickoff Meeting***

Welcome ..... George Ricker
CDR Format ..... Rick Foster

9:15AM ***Instrument Overview***

System Overview ..... Rick Foster
Detectors ..... Steve Kissel
- Expected Performance

Electronic Design ..... Frank LaRosa/Dick Elder
- Overview of design
- EM1 AE/TCE Test Results Summary (Hayashida)
- Changes From EM1
- EM2 Test results Summary

Mechanical Design ..... Fred Kasparian
- Overview of design
- Changes from EM1
- Bonnet Overview (Awaki)
- TTM review summary (Ozaki)
- EM2 Test Result Summary
- FM Environmental Test Plan at MIT

12:00 ***Lunch***

1:30PM ***Afternoon Session***

GSE ..... Michael Vezie
- Overview of design
- Changes from EM1
- Software Summary (Miyata)

Calibration ..... Steve Kissel
- MIT Calibration Plan Summary
- Calibration of EM1 Summary (Tsuru)
- Strategy for the XIS calibration (Dotani)

Performance Assurance ..... Brian Klatt
Planning ..... Rick Foster
- Deliverables List
- Fabrication Plan

4:30PM ***Wrap-Up Meeting***

Tuesday - January 13 1998

9:00AM **Kickoff Meeting**

Agenda Update ..... Rick Foster

9:30AM **Detailed Review Team Meetings**

Electrical
- Dick Elder, Frank LaRosa, John Doty,
  Kiyoshi Hayashida, Katsuji Koyama

Mechanical
- Fred Kasparian, Steve Kissel, Bob Dill,
  Hisamitsu Awaki, Hiroshi Tsunemi

Ground Support Equipment (GSE)
- Michael Vezie, Beverly LaMar,
  Emi Miyata, Masanobu Ozaki

Calibration
- Steve Kissel, Mark Bautz, Ed Morgan,
  Takeshi Tsuru, Tadayasu Dotani

Planning (After Calibration Meeting)
- Rick Foster,Bill Mayer,George Ricker
- Steve Kissel, Mark Bautz
- Gus Comeyne
- Japanese members

12:00 **Lunch Break**

1:30PM **CDR Wrap-up Meeting**

Subsystem Action Item Review & Disposition
- Electrical - Dick Elder
- Mechanical - Fred Kasparian
- GSE - Michael Vezie
- Calibration - Steve Kissel
- Planning - Rick Foster

Wednesday's Agenda

Wednesday - January 14 1998

9:00AM **Kickoff Meeting**

- Subgroup meeting agenda (As Required)

Astro-E SI Layout

(Sideview)

Rev 1.0 1/7/98

XIS
(2 of 4)

XIS Fabrication and Test Plan Summary

Rev 1.0
12/15/97

MIT Center For Space Research
70 Vasser Street
Cambridge MA

1.1 Introduction

The purpose of this document is to layout the general fabrication and test plan for the MIT portion of the X-Ray Imaging Spectrometers (XIS) that will fly aboard the upcoming Japanese mission Astro-E . It is for the most part limited to those activities undertaken by MIT prior to the instrument delivery to Japan. For a full picture of the complete test suite, this plan would have to be augmented with the planned test activities involving the flight units after they are delivered to Japan

1.2 Deliverables Master Schedule

As part of the program, there is a significant amount of hardware and software being produced to support the needs of the program. The following table lists the items that are required along with their fabrication status as of the time of the Critical Design Review (CDR).

Several of the items listed in the table need to be finalized both with the PI team and with the various organizations that implement contract changes. Those items are identified by a TBD in the notes column.

Unit	Owner	Due Date	Status	Notes
AESIM1.1	PI	Oct96	D	
AESIM1.2	MITe	Nov96	D	
AESIM1.3	PI	Jan97	D	
DESIM1.1	PI	May 97	D	
DESIM1.2	MITe	May 97	D	
VacChamber1.1	PI	May97	NR	Not required, remove from contract (TBD)
VacChamber1.2	PI	June98	NR	Not required, remove from contract (TBD)
SEGSE1.1	MITe	Jan 98	WIP	
SEGSE1.2	MITc	Jan 98	WIP	
SEGSE1.2	MITc	Jan 98	WIP	
SEGSE1.2	MITc	Feb 98	WIP	
SEGSE1.2	MITc	June 98	WIP	
SEGSE1.2	MITc	June 98	WIP	
AE/TCE EM1.1	PI	June 97	D	Upgrade to EM2 Config. Feb98 (TBD)
AE/TCE MM1.1	MITe	Dec 97	D	
AE/TCE EM2.1	MITe	Dec 97	D	
AE/TCE EM2.2	MITc	Jan 98	WIP	
AE/TCE EM2.3	MITc	Jan 98	WIP	
AE/TCE EM2.4	MITc	Feb 98	WIP	
AE/TCE EM3.1	PI	Sept 98	NA	TBD .. Add to contract
AE/TCE FM1.1	PI	June 98	NA	
AE/TCE FM1.2	PI	June 98	NA	
Spares FM1.1	MITe	June 98	NA	
Sensor EM1.1	PI	June 97	D	
Sensor MM1.1	MITe	Dec 98	D	
Sensor FM1.1	PI	June 98	NA	
Sensor FM1.2	PI	June 98	NA	
Sensor FM1.3	PI	June 98	NA	

Sensor FM1.4	PI	June 98	NA	
Sensor FM1.5	PI	Sept 98	NA	
Container1.1	PI	May 97	D	Sensor Body
Container1.2	PI	June 98	NA	
Container1.3	PI	June 98	NA	
Container2.1	PI	May 97	D	AE/TCE
Container2.2	PI	June 98	NA	
Container2.3	PI	June 98	NA	
Container2.4	PI	June 98	NA	
Container2.5	PI	June 98	NA	
Container2.6	PI	Sept 98	NA	
Container3.1	PI	May 97	D	EGSE
Container3.2	PI	June 98	NA	
Container3.3	PI	June 98	NA	
Container4.1	PI	Sept 98	NA	Lab AE/TCE

1.2.1.1 Status Codes

D	Delivered
NA	Not Activity
NR	No longer required
WIP	Work in progress, material kitted & assembly scheduled

1.2.1.2 Configuration Descriptions

AESIM1.x

ANALOG ELECTRONICS SIMULATOR VERSION 1
Berkeley Camera S56DSP Board
Custom interface electronics box
Interconnect Cables (Not Vacuum Compatible)
DSP -> AESIM
AESIM_MPU ->target
AESIM_PPU ->target
Software running under SunOS4.1.x

DESIM1.x

DETECTOR ELECTRONICS SIMULATOR VERSION 1
2 Berkeley Camera S56DSP boards
Custom interface electronics Box
Interconnect Cables (Not Vacuum Compatible)
DSP(2) -> DESIM
DESIM_MPU ->target
DESIM_PPU ->target
Software running under Solaris1.x

SEGSE1.x

SUPER ELECTRICAL GROUND SUPPORT EQUIPMENT VERSION 1
1-3 Berkeley Camera S56DSP boards
(Number of Boards delivered w/ each system TBD)
2 DESIM Only Mode
1 AESIM Only Mode
3 AESIM/DESIM Mode
Custom interface Box
Interconnect Cables (Not Vacuum Compatible)
DSP(2) -> SEGSE
SEGSE_MPU ->target
SEGSE_PPU ->target
There are other non-standard diagnostic cables
Software running under

SunOS4.1.x - AESIM section
Solaris - DESIM section

AE/TCE EM1.x ANALOG ELECTRONICS AND THERMAL CONTROL ELECTRONICS ENGINEERING
MODEL VERSION 1
XIS Backplane,Controller and TCE engineering boards
HETE Driver and Video Boards
2 AE/TCE to Sensor CCD Cable (1 vacum compatible)
2 AE/TCE to Sensor TEC Cable (1 vacum compatible)
Side B populated with thermal dummy boards
Not all components in flight packages
Almost Flight like housing (Low epsilon surface)

AE/TCE MM1.x ANALOG ELECTRONICS AND THERMAL CONTROL ELECTRONICS MECHANICAL
MODEL VERSION 1
XIS Backplane
Mechanical Mass Model PCBs on both sides A and B
Almost Flight like housing (Low epsilon surface)

AE/TCE EM2.x ANALOG ELECTRONICS AND THERMAL CONTROL ELECTRONICS ENGINEERING
MODEL VERSION 2
All XIS engineering type boards
Side B unpopulated
Lab Box Housing
1 AE/TCE to Sensor CCD Cable (Not vacum compatible)
1 AE/TCE to Sensor TEC Cable (Not vacum compatible)
Not all components in flight packages
Not vacuum compatible

AE/TCE EM3.x ANALOG ELECTRONICS AND THERMAL CONTROL ELECTRONICS ENGINEERING
MODEL VERSION 3
All XIS flight type boards (Not conformally coated)
Side B unpopulated
Lab Box Housing
1 AE/TCE to Sensor CCD Cable (Not vacum compatible)
1 AE/TCE to Sensor TEC Cable (Not vacum compatible)
Not vacuum compatible

AE/TCE FM1.x ANALOG ELECTRONICS AND THERMAL CONTROL ELECTRONICS FLIGHT
MODEL VERSION 1
All XIS type boards
Build with flight components
Flight Housing per MICD
2 AE/TCE to Sensor CCD FM Cables
2 AE/TCE to Sensor TEC FM Cables
Flight Qualified

Spares FM1.x ELECTRONIC SPARES, FLIGHT MODEL VERSION 1
1 set of key flight qualified components
1 CCD Assembly
1 Backplane
1 Video Board
1 Controller Board
1 Driver Board
1 TCE Board

Sensor EM1.x SENSOR BODY W/CCD, ENGINEERING MODEL VERSION 1

Fully functional CCD & TEC
Unbonded detector
Spreader Bar Configuration

Sensor MM1.x SENSOR BODY W/CCD, MECHANICAL MODEL VERSION 1
Non-functional CCD & TEC
Flight Like mechanical configuration

Sensor FM1.x SENSOR BODY W/CCD, FLIGHT MODEL VERSION 1
Fully Functional
Flight Qualified

1.3 Environmental Tests

The following matrix represents the planned environmental tests to be conducted by MIT prior to delivery of the instruments. Since the MIT portion is only part of the XIS instrument, further environmental tests of the integrated flight instrument will be conducted in Japan. The details of those tests are not covered by this plan.

	Random	Shock	Thermal	Vacuum	EMC
AE/TCE MM1.1	QT	QT	N	N	N
AE/TCE EM2.1	N	N	Y	N	P
AE/TCE FM1.1-2	AT	AT	Y	Y	N
Spares FM1.1	AT	AT	Y	Y	N
Sensor EM1.1	N	N	Y(J)	Y(J)	N
Sensor MM1.1	QT	QT	C -->	<-- C	N
Sensor FM1.1-5	AT	AT	C -->	<-- C	N

Random Vibration
AT - Acceptance Test Levels
N - Not Necessary
QT - Qualification Test Levels

Shock
AT - Acceptance Test Levels
N - Not Necessary
QT - Qualification Test Levels

Thermal
N - Not Necessary
Y - Yes
Y(J) - Yes, data from ISAS TTM test used
C - Combined with vacuum test

Vacuum
N - Not Necessary
Y - Yes

Y(J) - Yes, data from ISAS TTM test used
C - Combined with thermal test

EMC

N - Not necessary
P - Partial (Secondary power noise,ripple and transient susceptability)

1.3.1 Environments Analyzed

1.3.1.1 Radiation Effects on Analog Electronics

For the AE/TCE, which has a minimum housing wall thickness 0.040", a general guideline of 2K RadsSi Total Dose was used in the parts selection process. System design will preclude permanent damage due to single event latch up.

1.3.1.2 No Impact Environments

These environments were briefly reviewed and they did not appear to have a first order effect on the MIT portion of the XIS instrument, so no further analysis/tests were conducted.

Acoustics
Spin
Incident Sunlight
Earth Emitted Radiation and Earth Albedo

1.4 Electronic Parts

In most cases, parts were chosen that have flight heritage on one of the other CSR missions (AXAF,XTE,HETE or Astro-D). While many of these are Mil-Std parts, other are procured as Industrial Grade, based on engineering considerations such as temperature range, packaging, power consumption, etc.

All parts selected will be reviewed by the MIT CSR Product Assurance Manager to confirm that there are no alerts out against the parts and to suggest alternate parts/packaging that would improve reliability. In addition to standard parts screening, a review of the parts from a radiation tolerance point of view will be conducted.

1.5 Delivery and Transportation

Since there are several contracts that govern this project, there is a need to closely coordinate the details associated with the delivery of finished goods. The follow guidelines, established using the earlier engineering model delivery as pathfinder, should allow for an efficient transfer of the flight and support equipment

- NEC-USA is responsible to obtain an export license for all the equipment that needs to be transferred between the U.S.A and Japan.
- MIT is responsible to provide NEC-USA a detailed description of the items that need to be shipped. this description will be itemized by shipping container
- MIT suggests that the export license cover the period of June 1, 1998 thru Dec 1,1998 and be structured so that individual shipping containers may be sent separately if needed.
- MIT must first transfer ownership of the deliverable items to NASA-GSFC, who in turn will transfer ownership to NEC-USA.This transfer will be on paper only, as the equipment is not planned to physically leave MIT. Once NASA-GSFC has signed over the equipment to NEC-USA, their representative may take possession of the

equipment at MIT for delivery to Japan. NEC-USA is responsible for all shipping and handling of the equipment once they pick it up at MIT.

The details of what constitutes a reasonable acceptance criteria is still TBD at this time and needs to be worked out in the near future.

MIT level participation in the initial setup of the equipment in Japan is still TBD at this time and will be worked out prior to receipt of the equipment at Osaka/Kyoto Universities.

Massachusetts Institute of Technology
Center for Space Research
Cambridge, Massachusetts 02139

617-253-7502

Room 37-241 FAX 617-253-3111

Tue, Feb 10, 1998

Mr. David Baden
International Projects Resource Manager
Code 404
Goddard Space Flight Center
Greenbelt, MD 20771

Dear Mr Baden,

This letter, and the attachments enclosed, are in response to your request for POP Data for the MIT/CSR project on Astro-E (Contract NAS5-32929). The answers below follow the order of the questions presented in your letter of January 23, 1998.

1) The Master Schedule for the MIT activities for the XIS experiment on Astro-E are presented on the attached chart taken from the CDR presentation in mid-January at MIT. Since that time there have been no changes to the schedule, so the attachment is still accurate. We still expect to make our delivery of the flight hardware to GSFC (for immediate transfer to NEC-USA) by the end of June, 1998.

2) The current contract value of $4,631,134 was established by Modification #1 of the contract, dated May 24, 1996.

3) There are no known problems associated with the current contract for the delivery and integration of MIT hardware into the Astro-E mission. However, in the context of a 5 year budget plan, you should be aware that the current contract does not include any funding for Mission Operations and Data Analysis (MO&DA). An RFP for this activity has not been received; in fact, discussions of the SOW for the MO&DA tasks have not yet been initiated. However, one could reasonably assume that the SOW and funding requirements for MO&DA on Astro-E will be similar to that on Astro-D (ASCA). This ASCA work is funded via a Grant (NAG5-2685) from GSFC and is managed from Code 668 (Dr. Nick White). This grant has a four year period which ends in August of this year, and a total TEC of $1,179,000.

4) The cumulative actuals through January, 1998, by element of cost, are shown in the table below:

Element of Cost	1/31/98 Cumulative Amount
Salaries and Wages	379.8
Employee Benefits	175.3
Indirect Costs	535.6
Travel	41.1
Materials and Services	359.1
Subtotal	1,490.9
Lincoln Laboratory (CCDs)	706.9
ESPACE	157.3
Total	2,355.1

5) Monthly projections for the period of Feb. 98 to Sept. 99 are provided on pages 1 and 2 of the attached table (Astro-E POP, 2/98).

6) The projection for Fiscal Year 2000 is provided on page 3 of the attached table (Astro-E POP, 2/98). This page also includes the overall project total cost.

If you have any questions on the data provided, please feel free to call.

Sincerely,

William F Mayer

William F Mayer
CSR Associate Director

REPORT DOCUMENTATION PAGE

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OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	March 1998	Contractor Report

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MIT–CSR XIS Project

5. FUNDING NUMBERS
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IN 33
37485

6. AUTHOR(S)

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS (ES)

Massachusetts Institute of Technology
Center for Space Research
Room NE80-6073
Cambridge, MA

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13. ABSTRACT *(Maximum 200 words)*

This report outlines the proposers' progress toward MIT's contribution to the X-Ray Imaging Spectrometer (XIS) experiment on the Japanese ASTRO-E mission. The report discusses electrical system design, mechanical system design, and ground support equipment.

14. SUBJECT TERMS
ASTRO-E; XIS.

15. NUMBER OF PAGES
19

16. PRICE CODE

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