Don Johnson
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Issued: October 5,1978

Monthly Report

for

September 1978

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W. Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

An internal system design review was held on September 8 with Dick White of GSFC and Doug Byal of ONR in attendance. Subsystem specifications were reviewed for the image dissector tube (IDT) and IDT assembly, the high voltage power supply (HVPS), power converter and distribution subsystem (PCDS), signal processor subsystem (SPS), and deflection amplifier subsystem (DAS). Some schematic diagrams of portions of the DAS and SPS were presented. The data and command processor (DCP) was discussed informally because a specification has not yet been written. The latest DCP design concepts were reviewed and several fundamental questions were identified. One question was whether the DCP design should be based on a time slice or an interrupt approach. After much discussion a third alternative was agreed upon that employs direct memory access for the engineering data.

A major effort was made after the review to revise the IDT,IDT assembly, HVPS, and PCDS specifications for inclusion in RFPs. A general specification, performance assurance specification, and work statements were also written. The IDT RFP package was sent to the UW purchasing department at the end of the month and should be in the mail by October 9. The PCDS and HVPS RFPs are expected to be mailed by October 23. The delay is due to the time required to seek additions to the RFP mailing list.

Breadboards have been assembled for the pulse amplifier/discriminator and the A/D converter elements of the SPS. The breadboards are now being tested.

A half scale wood mockup of the HSP was completed in early September. It has proven to be a useful tool in reviewing packaging concepts, checking for interferences, etc.

The thermal model indicates that 15 watts of heater power in the ODS will maintain the ODS temperature at operating levels in the hold mode. We have therefore incorporated provision to control such heaters in the PCDS specification.

The electronics packaging concept is under study. Rather than have separately packaged DAS,SPS, and DCP units it may be better to have the DAS, SPS, and detector controller functions packaged in one unit for each detector. One advantage would be to sharply reduce the number of internal interface connections required.

The PICD was reviewed and comments were sent to all IFWG members early in September. Support of the IFWG, structural and mechanical subgroup, and thermal subgroup meetings in addition to the A&VWG, contamination subgroup, Software WG, and MOWG meetings the previous week consumed a major portion of the engineering labor hours in September.

A power distribution and grounding study was completed and a preliminary configuration drawn. This configuration is being used as the basis for the PCDS and HVPS grounding requirements.

Tom Taylor and John Lesko met with us here in late September in an attempt to provide information which was not available at the software WG due to GSFC travel funding difficulties. The meeting was very helpful and provided a basis to proceed with design of DCP hardware and instrument software.

The C&DH ICD draft was received and is now being reviewed. Our comments will be extensive and will be provided early in October as requested.

Mass properties have not changed since the last report in August. The estimated weight remains at 576 lbs. which includes a 30% (133 lb.) contingency as requested.

The power budget has not been updated. Instrument power remains at 116 watts in operating and standby modes, and approximately 20 watts in hold mode.

B. Schedule Section

The major schedule change is the delay of PDR from November 21 to December 20-21. This change was requested because another program at SSEC has impacted the planned level of manpower on the HSP program. The other program is near delivery and cannot release a technician as planned on October 1. There is doubt that with the technician manpower available, all necessary breadboarding and testing could be done in time for PDR. Other engineering and technician manpower assigned to the HSP program have been required to assist the other program in meeting emergencies and may be called upon to do so in the future. It is most likely that this will have little impact on overall HSP progress, but the possibility exists of significant impact if the other program encounters unforeseen problems. The GSFC STSOP will be promptly advised if such problems arise.

Milestones/events scheduled for October include:

1. Response to C&DH PICD by October 6.

2. Review of DCP system design concept - October 10.

3. C&DH IFWG meeting - October 12-13.

4. HSP investigation definition team meeting - October 17-18.

5. GSFC quarterly review - October 19-20.

6. S+M subgroup meeting - October 24 (tentative).

7. Review of the agenda for the November 2 and 3 contamination subgroup meeting in Denver to determine if HSP support is required.

8. Release of RFPs for the IDT assemblies, HVPS, and PCDS.

9. Phase 2 control negotiations/fact finding - October 12-13 (tentative).

C. Problem Areas

The following appear to be the major problem areas at this time:

1. The proposed upper limit on axial stiffness would significantly complicate our structural design and may cause the abandonment of the present design concept. The impact could be to start over with a new structural design which would also impact the thermal design and thermal modeling done to date.

2. The state of the C&DH ICD requires us to proceed with design on the basis of informal information received at working group meetings and from contacts with GSFC personnel. If this information later proves to be inconsistent with the C&DH ICD there could be major design impact resulting in cost and schedule growth.

3. The potential for manpower conflicts with another program at SSEC discussed in the schedule section.

D. Science Section

The principal science activity during September has been to participate in the subsystem specification reviews to assure the observing requirements are met. There has been considerable discussion with the software people to define operating modes, data and command requirements, etc. The RFP packages have also been carefully reviewed. A major concern is the system error budget which will be started in October.

E. Documentation Section

The project (GSFC) has requested changes in the delivery dates of OP-01 and SE-05 which we accept at no cost. The status of the phase 1 documentation to be delivered is as follows:

Art.III Item No.	DR No.	Title	Due	Expected
6	CM-04	Customer Review Data Package for PDR		Note 1
		Agenda	PDR-45D	11-6-78
		Data Package	PDR-2W	12-6-78
		Minutes	PDR+2W	1-15-79
9	DM-02	Instr.Program and Comp.List Preliminary	PDR-2W	12-6-78
10	DM-03	Ground Data Maintenance and Analysis Software Plan-Update	PDR-2W	12-6-78 Note 2
11	DM-04	Ground Test Software Plan - Final	PDR-2W	12-6-78
12	DM-05	SI Flight Software Plan-Final	PDR-2W	12-6-78
		SI Flight Software Requirements Document	PDR-2W	12-6-78
16	OP-01	SI Operations and Data Management Plan - Final	PDR-2W	12-6-78
19	SE-05	Design Reference Mission Inputs - Update	11-22-78	11-22-78 Note 3
20	SC-01	Scientific Investigation Studies Report	PDR-2W	12-6-78
22	SE-01	SI Systems Description - Preliminary	PDR-2W	12-6-78
23	SE-03	SI Math Models and Analyses Preliminary Description		
		Thermal	Delivered	
		Structural	PDR-2W	12-6-78
1	AV-01	Performance Verification Plan - Resubmittal (Note 5)	9-15-78	11-1-78
13	LS-01	Logistics Plan - Resubmittal (Note 5)	PDR-2W	12-6-78

14	MA-01	Management Plan - Resubmittal (Note 5)	-	12-6-78
17	PA-01	Performance Assurance Plan-Resubmittal	Note 4	12-6-78
4	CM-02	CEI Specification Part II-Update	Note 6	12-6-78

Note 1 Contract calls for CM-04 only for PRR. PDR package will be supplied as described in RFPU.

Note 2 DM-03 plan was submitted prior to PRR. Contract requires a plan prior to PDR. A plan update will be supplied for PDR.

Note 3 Per GSFC request - file 17343 dated 9-22-78.

Note 4 Per discussions with Arlene Peterson, resubmittal not formally requested by STSOP.

Note 5 Per GSFC request - file 13593 dated 7-3-78.

Note 6 Not required by contract.

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DR-MA-02 Number 7

Issued: November 7, 1978

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A. Technical Section

The RFPs for the high voltage power supply (HVPS), power converter and distribution subsystem (PCDS), and image dissector tube (IDT) subassemblies were released in October. The IDT bid opening (RFP due date) is November 13, and the HVPS/PCDS is November 20. The original HVPS/PCDS due date was November 6, but several bidders requested additional time.

Design effort in the analog electronics area fell behind in October due to unforeseen needs in other programs. Bob Leach left the Space Astronomy Laboratory in October which required Don Michalski to spend more time on several projects nearing completion: an Aerobee rocket payload which is scheduled for launch early next year, an instrument scheduled for delivery to Kitt Perk shortly, and continuing instrumentation work at Pine Bluff Observatory. Also, Scott Ellington of SSEC was needed for about two weeks in October to correct some problems which surfaced on another program. The result of this manpower loss will be to delay the design of the pulse amplifier/discriminator (PAD) approximately one month. The deflection amplifier, current to voltage converter, and analog to digital converter are proceeding on schedule.

The deflection amplifiers,including the focus amplifier, have been specified, a preliminary design breadboarded, and room temperature tested. A detailed part parameter analysis and temperature tests of a breadboard with low TC components remains to be done.

The current to voltage converter design is nearing completion and will be breadboarded and tested in November. The analog to digital converter has been specified, designed, and breadboarded. The breadboard was tested without the sample and hold circuit. The breadboard with the sample and hold circuit will be retested in November.

The PAD preliminary design has been reviewed and found to have insufficient bandwidth to resolve pulses the required 50 nanos apart. A new design based on an existing PAD used in ground observations is now being studied. Preliminary analysis indicates it can be made to operate within our power, speed, and other major requirements. It is this effort that is about one month behind schedule. We now expect the PAD design to be not as well developed at PDR as the other analog electronics, but this is not considered a major problem because the design is based on well developed ground instrumentation.

The digital electronics (system controller and IDT/PMT controller) are now the responsibility of Bill Phillips who joined SSEC in October. Preliminary design concepts have been worked out and there are no major timing problems evident. The specification of this subsystem and further design details remain to be done prior to PDR.

The mechanical and structural design is proceeding in the face of continued difficulties in resolving the interface details. Numerous small changes (i.e. in the design of the registration fittings and their location) have caused us to redesign portions of the structure. The static/dynamic envelope question will lead us to reduce the overall dimensions of the box to allow for deflection under load. A preliminary design for the electronics base plate has been worked out. Electronic box sizes and locations have also been specified.

The approach to thermal design may have to be changed if the presently proposed ICD cannot be relaxed. To meet the inner panel and registration fitting temperature requirement of -20° to +20° may require active thermal control which is not included in our present phase 2 proposal costs.

The GSE design concept changed in October. The new concept is to make the test connector signal complement identical to the HSP/OTA interface. This means the interface to our GSE will be the same as to the SI C&DH simulator and will thereby eliminate the need to design a separate interface unit for the test connector. The purpose and function of the test connector remains unchanged but now the RIU/EU will perform the required A/D conversion, formatting, etc, and will be included with the rest of the instrument for tests using the test connector. This change has simplified the specification of our GSE significantly.

The weight budget has been revised to incorporate the design changes to date and is attached. The total weight is now 599 pounds leaving 101 pounds contingency or 17%. A revised power budget is also attached.

B. Schedule Section

There have been no major changes in the schedule other than the delay in PAD design discussed above.

Milestones/events scheduled for November include:

1. System review (date TBD-mid November)
2. Phase 2 negotiations (fact finding at GSFC November 7)
3. Thermal meeting at LMSC, November 8-9
4. Electrical Power meeting at LMSC, November 9
5. IFWG at LMSC, November 14-15
6. Bid opening for IDT, November 13
7. Bid opening for HVPS/PCDS, November 20

C. Problem Areas

The major problems at this time are:

1. Manpower shortage in the analog electronics design area
2. Thermal interface: inner panel temperature and registration fitting temperature
3. RIU power interface

D. Science Section

The optical design was reviewed with our optical consultant, Dan Schroeder, in October. A ray tracing program has been implemented and will facilitate completion of the error analysis.

A team meeting was held in October. No major problems or concerns were identified. The location of the test lamp was discussed and was defined as an item that required definition. Subsequently, the subject of the lamp has been studied. It appears that the lamp can be low power (one watt or less), of conventional glass bulb design, and will be located to illuminate the photocathodes but not through the aperture plates. Two or three or more lamps will be required. It is not planned to use the test lamp in orbit except under emergency conditions.

E. Documentation Section

The status of documentation is unchanged from last month's report except for AV-01 which will be delivered 12-6-78 with the PDR data package.

Sources of New Weight

	8/15/78	11/2/78	Change
Main Spar	70	60	-10
Bolting Plate	0 (18)	18	+18
Electronics Base Plate	30 (40)	75	+45
Electronics Bulkheads	40	35	- 5
Registration Fittings	12 (30)	33	+21
Aft Panels	0	4	+ 4
Electrical Interface Panel	5	7	+ 2
Forward and Aft Bulkheads	40	50	+10
ODS Close Out	16	20	+ 4
Radiation Shield	0	20	+20
Electronics	56	103	+47
			+156

**** HSP WEIGHT BUDGET ****
11/2/78

PART NAME	X	Y	Z	WT
MAIN SPAR	12.25	12.25	43.30	60.00
BOLTING PLATE	15.17	15.17	43.30	18.00
ELECTRONICS BASE PLATE	25.35	25.35	43.30	75.00
ELECTRONICS BULKHEAD (8 PCS)	22.00	22.00	44.90	35.00
FORWARD BULKHEAD	17.70	17.70	.25	25.00
AFT BULKHEAD	17.70	17.70	86.40	25.00
ACCESS PANELS (8 PCS)	28.20	28.20	35.80	25.00
AFT PANELS (2 PCS)	26.10	26.10	78.60	4.00
ELECTRIC INTERFACE PANEL	30.00	30.00	79.10	7.00
FORWARD REGISTRATION FITTING	9.00	9.00	3.00	8.00
AFT REGISTRATION FITTING	6.00	6.00	83.60	25.00
ODS	6.00	6.00	20.00	95.00
ODS ACCESS @ X00	.70	26.40	20.00	7.00
ODS ACCESS @ Y00	26.40	.70	20.00	7.00
ODS CLOSE OUT	10.25	10.25	63.30	20.00
RADIATION SHIELD (X)	6.40	24.15	43.30	10.00
RADIATION SHIELD (Y)	24.15	6.40	43.30	10.00
CABLE HARNESS	30.00	30.00	43.30	20.00
FASTENERS	17.70	17.70	43.30	10.00
BRACKETS	17.70	17.70	43.30	10.00
PMT (BAY 1)	24.80	23.40	9.33	10.00
IDT (BAY 2)	31.60	27.92	26.98	10.00
IDT (BAY 2)	22.32	18.64	26.98	10.00
SYSTEM CONTROLER (BAY 3)	26.20	19.32	44.63	20.00
RIU (BAY 4)	24.80	23.40	62.28	6.50
IDT (BAY 6)	27.92	31.60	26.98	10.00
IDT (BAY 6)	18.64	22.32	26.98	10.00
PCDS (BAY 7)	19.32	26.20	44.63	20.00
RIU (BAY 8)	23.40	24.80	62.28	6.50

TOTAL WEIGHT =599.00

XCG = 17.54

YCG = 17.52

ZCG = 40.15

HSP POWER BUDGET

SYSTEM POWER INPUTS AND DISSIPATIONS

Optical Detector Subsystem (ODS)

	MINIMUM			NOMINAL			MAXIMUM		
	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Component Dissip.
HVPS (η = 0.85)	(915)	-	(840)	(1056)	-	(861)	(1250)	-	(890)
HVPS - 5 units	4574	-	4199	5279	-	4304	6250	-	4450
IDT Assembly									
Divider	-	-	(75)	-	-	(195)	-	-	(360)
Focus Coil	-	-	(954)	-	-	(1177)	-	-	(1425)
X Deflection Coil	-	-	(0)	-	-	(11)	-	-	(43)
Y Deflection Coil	-	-	(0)	-	-	(12)	-	-	(49)
Preamp	-	(140)	(140)	-	(140)	(140)	-	(140)	(140)
IDT Assembly Total	-	(140)	(1169)	-	(140)	(1535)	-	(140)	(2017)
IDT Assemlies (4 units)	-	560	4676	-	560	6140	-	560	8068
PMT Assembly									
Divider	-	-	(75)	-	-	(195)	-	-	(360)
Preamp	-	(140)	(140)	-	(140)	(140)	-	(140)	(140)
PMT Assembly Total	-	140	215	-	140	335	-	140	500
ODS TOTAL	4574	700	9090	5279	700	10779	6250	700	13018

	MIN			NOM			MAX	
Detector Electronics Assemblies								
Pulse Amp Discr.(PAD)	-	(1080)	(1080)	-	(1080)	(1080)	-	(1080)	(1080)
C-V/Digitizer	-	(1545)	(1545)	-	(1545)	(1545)	-	(1545)	(1545)
Focus Amp	-	(2340)	(1386)	-	(3120)	(1943)	-	(4425)	(3000)
Deflection Amps (2)	-	(990)	(990)	-	(1485)	(1462)	-	(2640)	(2548)
Detector Controller	-	(5854)	(5854)	-	(5854)	(5854)	-	(5854)	(5854)
Detector Electronics (IDT) Total	-	(11809)	(10855)	-	(13084)	(11884)	-	(15544)	(14027)
Detector Electronics (IDT) - 4 units	-	47236	43420	-	52336	47536	-	62176	56018
Pulse Amp Discr. (PAD)	-	(1080)	(1080)	-	(1080)	(1080)	-	(1080)	(1080)
C-V Digitizer	-	(1545)	(1545)	-	(1545)	(1545)	-	(1545)	(1545)
Detector Contoller	-	(5854)	(5854)	-	(5854)	(5854)	-	(5854)	(5854)
Detector Electronics (PMT) Total	-	8479	8479	-	8479	8479	-	8479	8479
Detector Electronics Assemblies Total	-	55715	51899	-	60815	56015	-	70655	64587
System Controller	-	22686	22686	-	22686	22686	-	22686	22686
Power Converter and Distribution Subsystem									
Status Logic	-	32	32	-	32	32	-	32	32
Detector Supply (IDT)	(14936)	-	(2987)	(16530)	-	(3306)	(19605)	-	(3921)
Detector Supply (IDT)-4 units	59745	-	11949	66120	-	13224	78420	-	15684
Detector Supply (PMT)	10774	-	2155	10774	-	2155	10774	-	2155
Digital Supply	28398	-	5680	28398	-	5680	28398	-	5680
Preregulator	-	-	18263	-	-	19512	-	-	21854
PCDS Total	98916	32	38078	105291	32	40603		32	45405

CHANGES FROM PREVIOUS BUDGET
(for nominal values only)

Item	Input Power Was	Is	Increase	Bus Power Increase
HVPSs	5000	5820	280	329
Preamps	150	700	550	809
PADs	3000	5400	2400	3529
C-V/Digitizers	7500	7725	225	331
Defl.Amps	2320	5940	3620	5324
Focus Amps	7200	12480	5280	7765
Det.Controller	5854	5854	0	0
System Controller	22686	22686	0	0
PCDS	32	32	0	0
			TOTAL	18087

Bus Power Increase*	18083
Previous Bus Power	112000
Present Bus Power	130083

* Difference due to roundoff error.

CONTINGENCY

Allowable SI Power	150000
Less RM/EU Power*	10000
Allowable HSP Power	140000
Present HSP Power	130083

Contingency (140000/130083-1)x100 = 7.62%

* Increased from 8000 per direction at October 1978 Quarterly Review.

	MIN	NOM	MAX
Spacecraft Power Input			
Total preregulator output	103490	110570	123841
Spacecraft power input (assume 0.85 efficiency)	121753	130083	145696
Secondary DC Power Balance			
Preregulator power available for secondary DC supplies	98916	105291	117591
Secondary DC Available (assume 0.85 efficiency)	79133	84233	94073
Secondary DC Loads			
IDT assemblies	700	700	700
Detector electronics	55175	60815	70655
System controller	22686	22686	22686
PCDS	32	32	32
Total Secondary DC Load	79133	84233	94073
Dissipation Power Balance			
HSP (less RIU) power input	121753	130083	145696
ODS	9090	10779	13018
Detector electronics	51899	56015	64587
System controller	22686	22686	22686
PCDS	38078	40603	45405
Subassembly Totals	121753	130083	145696

Notes:

1. All power given in milliwatts.

2. Minimum, nominal, and maximum values are based on operating modes of nominal units only. Does not include unit-to-unit variations.

3. Operating modes, with all detectors simultaneously powered, will be such that the total power consumption will rarely exceed the totals for nominal in the above budget.

4. Values given in parentheses are non-add subtotals.

5. The format of this budget is revised to reflect changes in HSP subsystem packaging design.

Don Johnson file

DR-MA-02 Number 9

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Monthly Report

for

December 1978

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
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A. Technical Section

The major effort in December was directed toward the PDR at GSFC on December 20-21, the cost and schedule review on December 19, and the submittal of the PDR data package on December 5. A PDR dry run was conducted at Wisconsin on December 11, which was attended by the ONR QAR.

Preparation for the PDR included a preliminary system error budget. The error budget requires more work before it can be included as an appendix to the CEI specification, part II, but the preliminary work completed to date has served to identify the critical areas of the system. A summary of the error analysis is included as an appendix.

A team of GSFC personnel visited Wisconsin on December 6 to discuss the C&DH system, the C&DH simulator, interface documentation,and software. Our telemetry requirements were discussed and it was agreed that we should include our serial engineering data with science data. This reduces the C&DH memory requirements that would otherwise result if the C&DH had to store subcommutated engineering data. The date the C&DH control computer is to be delivered to GSFC or the Science Institute was discussed. Delivery of that computer substantially before launch would remove our capability to debug software. Considering all the computers involved in the program it was agreed that it should be possible to work out a mutually acceptable schedule that would allow us to complete software work prior to C&DH control computer delivery.

The recent ICD changes have not been fully incorporated into the design as of PDR. ECPs will be prepared as soon as the impact has been determined.

The thermal model is being updated to include the effective sink temperatures defined in the ICD, the revised subsystem configuration, the latest power budget, and the operating modes now defined by the ICD. The FPS thermal barrier will be included as soon as its properties are known. Because of the comments made at the PDR expressing some doubts about the thermal design, the revised model will be submitted to GSFC for review with sufficient information to enable the reviewer to understand the model inputs. It should be noted that the thermal properties of the various nodes in the math model are based on published data (i.e. "A Joint Heat Transfer Data Critical Study and Design Guidelines Final Report, Contract NAS8-26490, GE Document number 715D4241, 6-7-71) which has been confirmed by previous experience at Wisconsin on the OSO and Pioneer Venus programs. The values selected for conducting and radiating paths are intended to be conservative. These values should be achievable with reasonable but not extreme care in manufacturing or assembly. Since some doubts were expressed at the PDR about the ability of the HSP to perform on the thermal math model predicts we believe it is urgent that the STSOP carefully review the model and suggest where it may be in error.

After some difficulties over EEO clearance were overcome, the phase 2 contract was received in time to preclude a gap between phase 1 and phase 2.

The subcontract for the image dissector tube assemblies will be issued in January if PDR committee suggestions are received promptly. Reservations were expressed to us by members of the review committee about the extent of the planned reduction in acceptance testing of the tube assemblies to reduce cost. The supplier has submitted a revised quotation based on the reduced testing and we are now ready to revise our specification and statement of work accordingly.

The high voltage power supply bidders will be evaluated in January. A selection will be made and a subcontract issued shortly thereafter.

The PCDS procurement has been delayed by the lack of response to the initial RFP and the cost of the responses received. Discussions have been carried on with the present and prospective bidders in an attempt to reduce the cost and introduce more competition. Some specification changes may be required to reduce the cost to an acceptable level. Once the specification and statement of work are revised, a new RFP will be issued. The GSFC project office was requested to review the PCDS specification and suggest changes which may reduce cost without unduly compromising performance.

B. Schedule Section

No major schedule changes have been identified in December. The schedule impact of the November ICD changes has not been determined and the revised TSU schedule has not been released. Until these items are defined, the schedule remains as shown in the phase 2 proposal as presented at the PDR. There will be some further adjustment necessary after the subcontracts have been issued to incorporate the revised subsystem engineering model delivery dates. A near term phase 2 schedule will be included in next month's report.

Milestones/events for January include:

1. HVPS/PCDS pre-award surveys (1/15-18)
2. Image Dissector Tube subcontract award
3. GSFC visitation: parts program review

C. Problem Areas

The problems being addressed at this time include:

1. Analysis of error induced by structural deformation caused by thermal gradients (This was a point raised at the PDR).

2. Cosmic ray rejection: Another point raised by the PDR was errors induced by cosmic ray events. Logic will be incorporated to reject cosmic ray events.

3. Assessment of ICD changes including the new survival temperature of -90°C in addition to the items detailed in last month's report.

4. Analog electronics design manpower continues to be tight due to demands of other programs.

D. Science Section

The computer model analysis of the optical subsystem has been started and results so far confirm the basic design concept. The analysis has shown the need for one change which was briefly described at the PDR. With the astigmatism introduced by spherical relay mirrors added to the astigmatic ST images, the image size at the three dissector tubes (about 8 arc minutes off-axis) becomes about 150μ . This requires a larger IDT aperture than we had hoped to use with a corresponding increase in dark count. As an alternative, a slightly non-spherical off-axis ellipsoid was found which decreased the ST astigmatism reducing the geometric image size to about 50μ . Image spot diagrams for three points in the focal plane are shown in the enclosed figure.

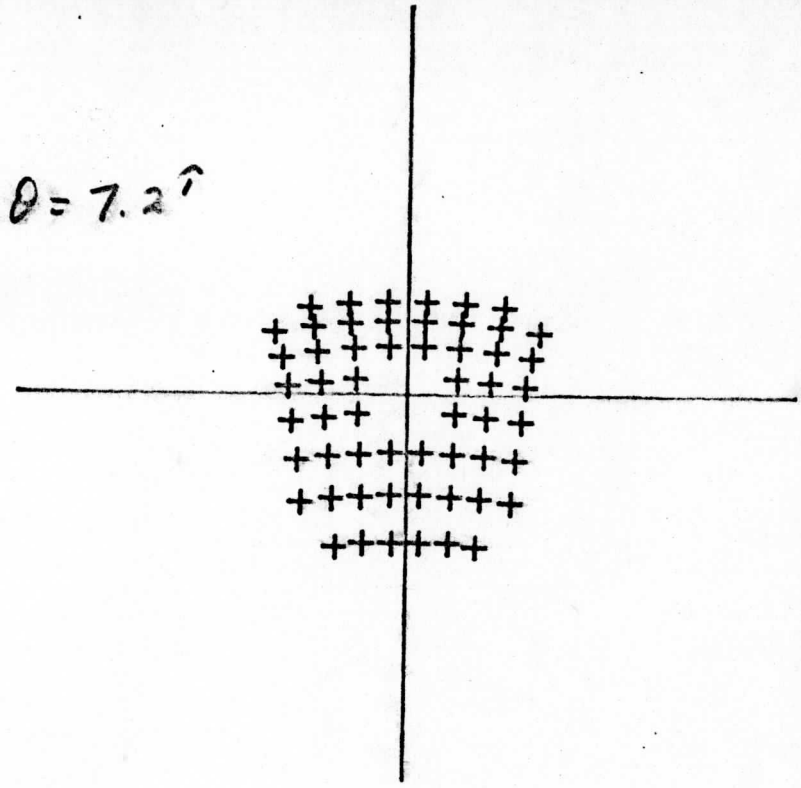
Calculations enabling a final optical lay-out to be made were completed. These results differ from those described at PDR by only millimeters and fractions of a degree. This work will be presented to the HSP team for their approval or modification at our next meeting in February.

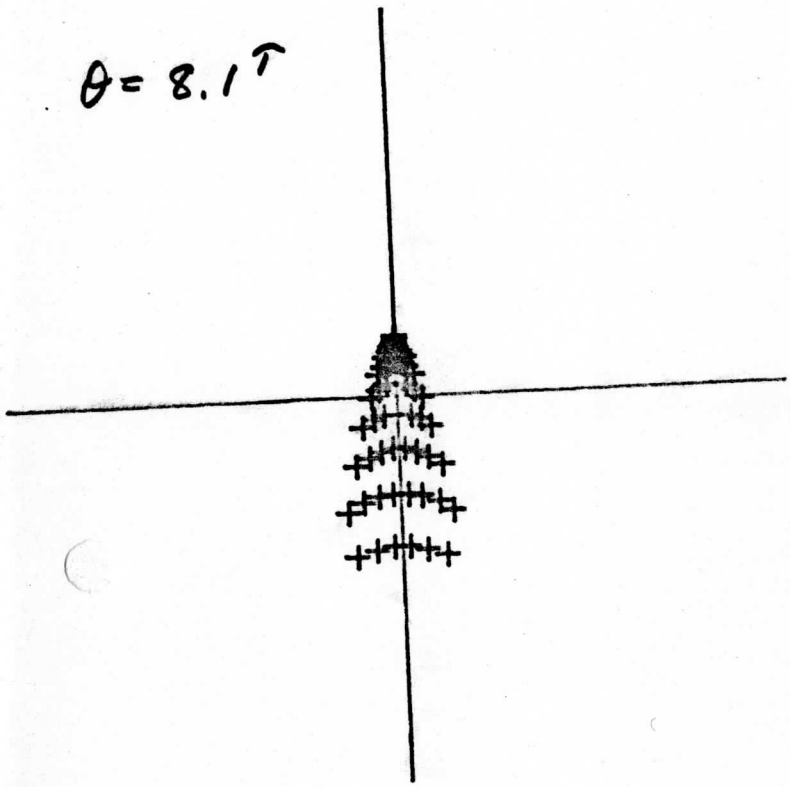
E. Documentation Schedule

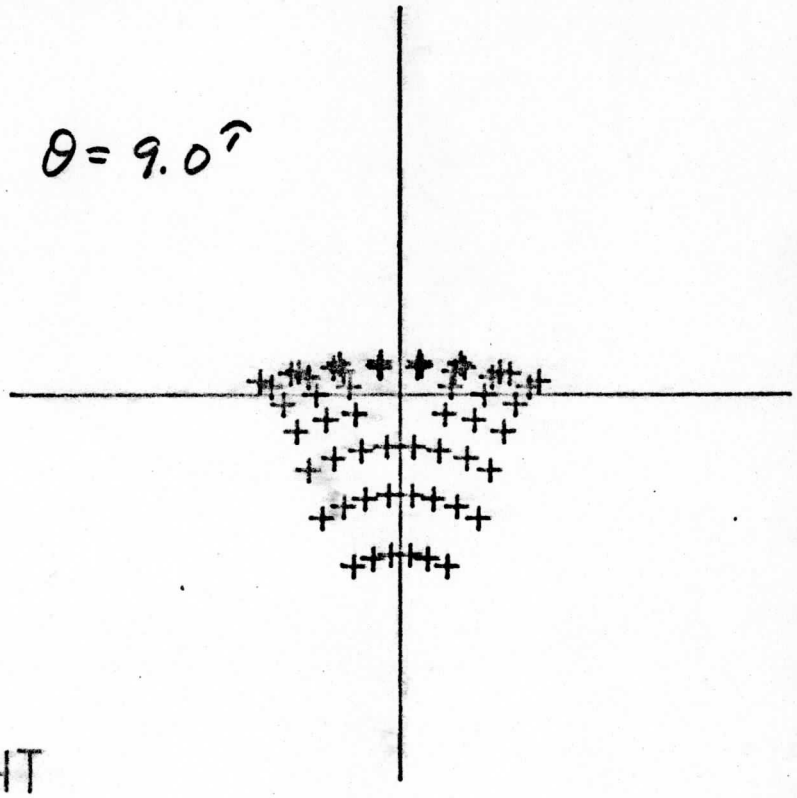
The status of documentation is unchanged from last month's report. The scheduled December deliveries were made on December 5. DM-01 will be delivered in January and DM-02 shortly thereafter. Phase 2 documentation is scheduled as shown in Table D-1 of the phase 2 contract statement of work. This schedule will be revised and included in future reports as appropriate.

F. Weight and Power Budgets

The weight and power status is unchanged from the last reported values which were also presented at the PDR.







CHIEF RAY HEIGHT

FOCUS SHIFT 0.000000

1 INCH = 0.025000 mm

APPENDIX A

HSP ERROR ANALYSIS

A preliminary HSP error analysis was performed in December and is summarized below:

Case 1 Current Measurement Gain Error

A. Pointing/Alignment error

1. ST pointing error

.007	jitter (assume target centered)
.01	pointing uncertainty
.017	total uncertainty

2. Aperture position (HSP) (For $\Delta T = 5°C$ during observation)

a) Filter plate moves 17μ longitudinally, spot size changes 0.7μ. Since ST image size is 125μ , effect is insignificant. Lateral motion is 25μ or 20% of image size - again insignificant.

b) Focal plane (aperture plate) moves 17μ longitudinally - not significant. Lateral motion is 25% of small (0.4 arc sec) aperture, 10% of large (1.0 arc sec). Can be recentered by raster scan/fine pointing.

Note: 1.0 arc sec ≡ 280μ , 0.4 arc sec ≡ 112μ

B. Pointing/Alignment/Deflection/Focus Drift (for T = 5°C)
IDT image size 50-100μ

1. Image motion approx. 3μ due to optical bench deformation
2. Magnetic fields: <1μ
3. Deflection/Focus amplifier drift: <1μ
4. Quantization error: 2μ

Total 7μ worst case

IDT aperture response 0.3%
Cathode non uniformity <ε

⟹ Not significant error source

C. Detector Gain

1. HV drift: for 1% HV 11% Δgain

temperature (5°C)	0.05%
drift (24 hours)	0.03
load current Δ	0.01
	0.09% ⟹ Δ gain 1% (significant)

2. Dark current - calibratable

3. Current to voltage converter gain Δ for 3°C ΔT: 1.3% lowest scale
(% of full scale) 0.7% highest scale

Note: Use pulse count for low scale to increase precision.

Case 2 Current measurement Noise Error (for 20μsec pulsar measurement, 0.2mv relative magnitude accuracy)

I. Detector Noise
@ 1 na = 3% full scale (1 Hz BW)
@ 10 na = 0.03%

J. Amplifier Noise
0.03% @ 1μA
0.003% @ 10μA Not significant

K. Sampling improvement observation dependent.

Case 3 Pulse Counting Gain Error

A. Same as case 1.

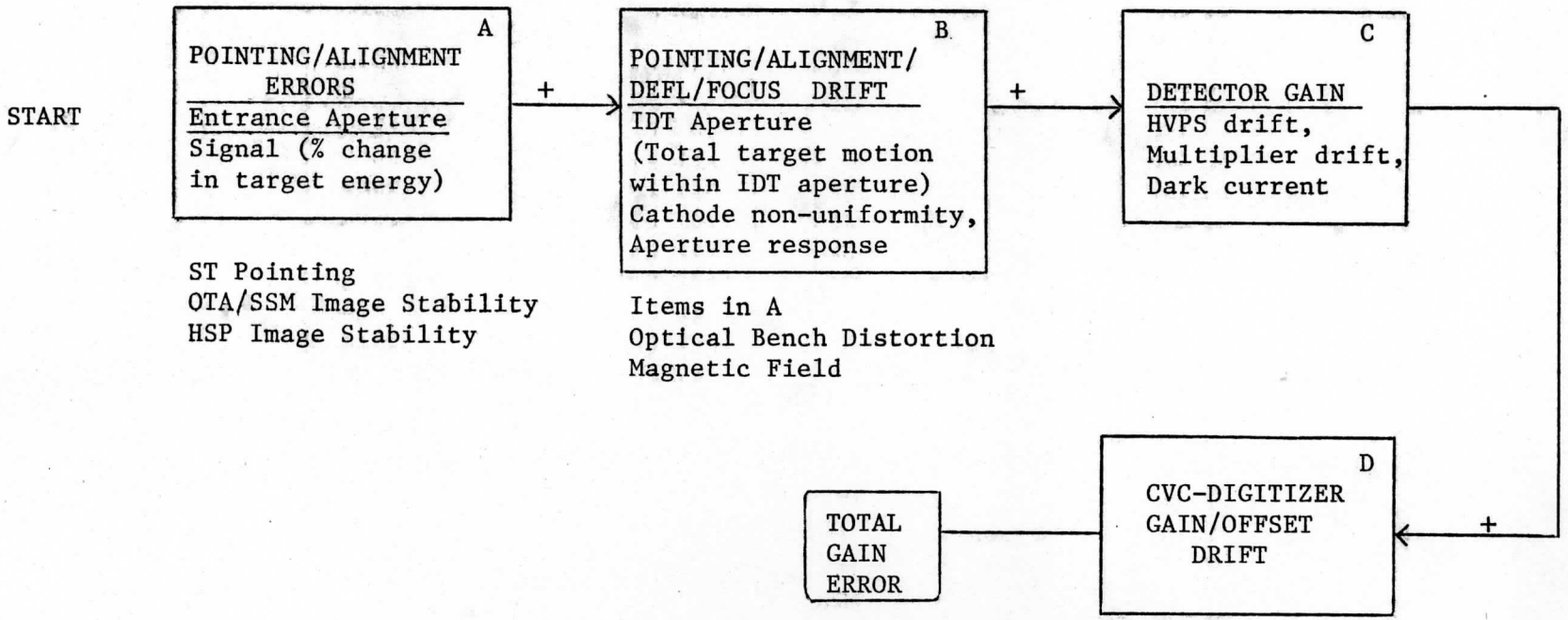
B. Same as case 1.

E. Pulse deadtime uncertainty error
0.3% @ 10^5 pps → 16 nA (10^6 gain)
3.0% @ 10^6 pps → 160 na
Assuming 30 ns uncertainty (worst case). If 6ns uncertainty then
0.060% @ 10^5 and 0.6% @ 10^6.

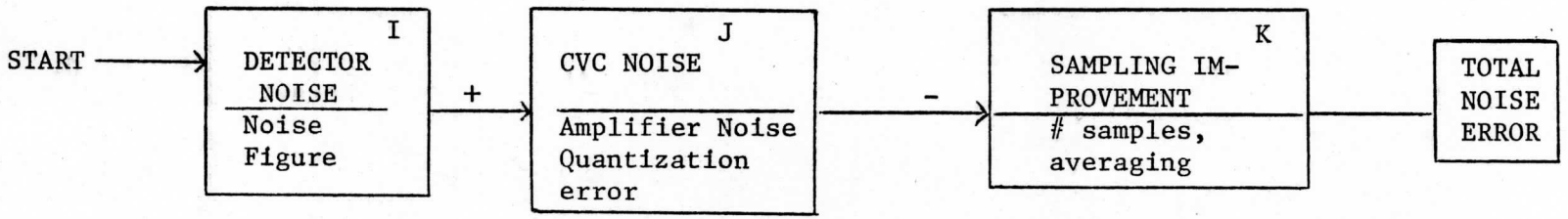
Case 4 Pulse Counting Noise Error

F. Detector dark count
Changes X2/5°C
0.15 ctr/sec @ 0°C for S-20
Calibratable, small effect
UV tube lower by X10

G. PAD/Preamp Noise
PAD: < 0.01 ctr/sec at tube gain 10^6 (negligible)
(at minimum threshold (=15%), $5X10^5$ gain, count rate 10^5 pps
then noise = 20%)
Threshold dependent, not significant if threshold properly selected.

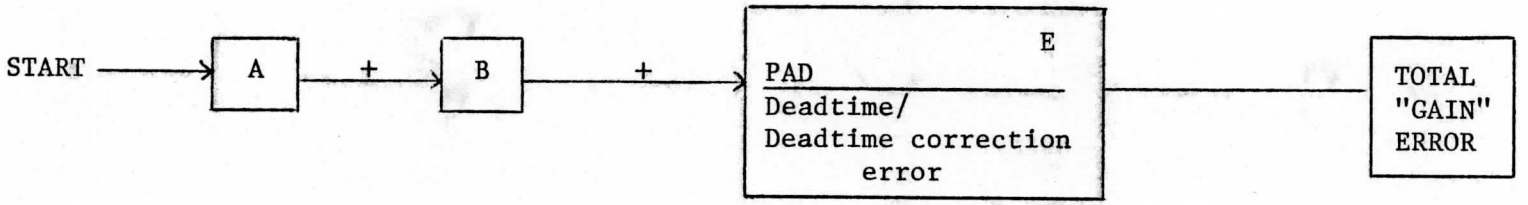


CURRENT MEASUREMENT GAIN ERROR

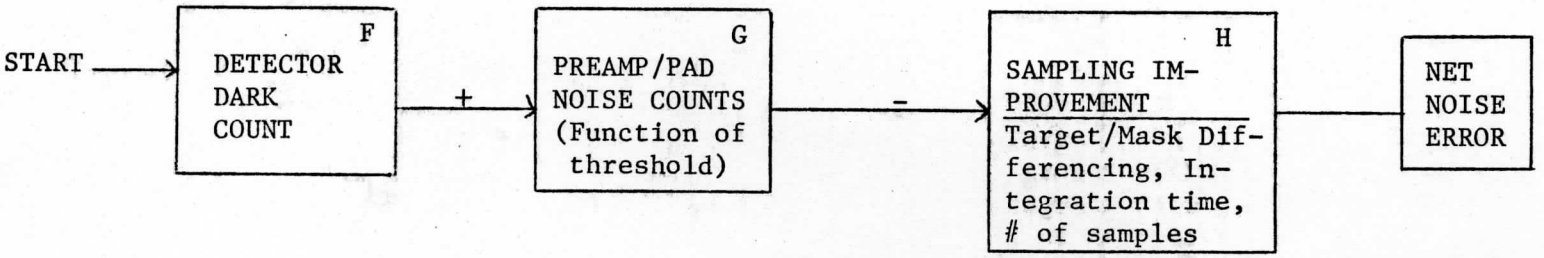


10^6 gain
k = 3

CURRENT MEASUREMENT NOISE ERROR



PULSE COUNTING GAIN ERROR



PULSE COUNTING NOISE ERROR

Don Johnson
file

DR-MA-02 Number 11

Issued: March 5, 1979

Monthly Report

for

February 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W. Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Subcontracts were written for the High Voltage Power Supply (HVPS), Image Dissector Tube (IDT) Assemblies, and Power Converter and Distribution Subsystem (PCDS), and were sent to the University purchasing department. The HVPS and PCDS orders have been issued and are in the mail. The IDT order is being held pending completion of final negotiations. All subcontractors were sent an advance copy of the subcontract that was being sent to purchasing. ITT, after reviewing this advance copy, called purchasing to advise them of possible changes. The order was therefore put on hold. A meeting is scheduled for March 5 to resolve the remaining difficulties, which appear to be legal technicalities. A four man team from ITT is coming to carry out the negotiations.

An RFQ was sent to A.O. Smith for NASTRAN modeling and the bid opening is scheduled for March 5. A purchase order is expected to be issued within a week of the bid opening.

The PAD discriminator threshold stability question has been discussed with the investigation definition team and the specification has been revised. A comparator type discriminator is now the design baseline. The HSP error budget analysis shows the discriminator level stability is a significant contributor to overall system error and must therefore be carefully controlled. Breadboard tests of the revised discriminator design are scheduled for the first week in March.

A change in the system controller/detector controller design is under consideration. In the highest data rate, shortest integration time observing modes, an 8-bit data word will be sufficient. If the normal 16-bit word is split into two 8-bit words at the higher data rates, some savings could be realized in data buffering memory space requirements. This mode will be incorporated into the specifications and DRs. Some power savings are anticipated due to the reduced buffer memory requirement. Most engineering model and breadboard parts have been ordered.

The mechanical and thermal design was proceeding satisfactorily toward the start of NASTRAN modeling in early March until a change in direction was received from the STSOP. We were advised that the HSP maximum weight will be reduced from 700 lbs. to 600 lbs. and that the present weight budget should be reduced to 513 lbs. by late April. It is too early to report the full implications of this direction, but it appears at this time that a significant TSU delivery impact may result. It was planned to begin detail design and manufacturing long lead items such as the main spar, electronics baseplate and bulkheads in parallel with the NASTRAN modeling activities. However, those items are also where possible weight savings may be obtained. One approach to the weight reduction program is to share the heavier elements that have the largest safety margins and iterate the model. Therefore, their manufacture must await the results of the NASTRAN modeling.

Another implication of a weight reduction program is a more complex NASTRAN model at the beginning rather than the coarse model that was planned. It is also clear that the thermal model must be updated with the NASTRAN model because the heat dissipation in the HSP depends mostly on conducting paths to the radiating surfaces. Much of the present structure is dictated by thermal as much as mechanical considerations. To properly conduct a weight reduction program will require several iterations of the thermal, NASTRAN modeling cycle. Because of the limited size of the HSP team, these iterations may cause severe schedule impact.

Two part-time student employees were added in February to assist in mechanical design tasks. One is assigned to electronics subsystem enclosure detail, and the other to optical system layout detail.

No response has yet been received to any of the thermal design data submitted since PDR.

No further activity has taken place in regard to the parts screening activity to be performed by GSFC. All HSP subcontractors have been advised of this arrangement and plan to take advantage thereof.

The 8080 microprocessor system has been assembled and checked out and is ready for use.

NSSC-1 core usage has been re-estimated. The previous and revised estimates are shown below. The categories indicated in the last column may be part of the variable allocation. The remaining categories are part of the fixed memory allocation.

C&DH MEMORY ALLOCATION-HSP

ITEM	WAS(K WORDS)	IS	VARIABLE
SI Control	1.5	1.5	
Engineering Data	0.5	0.0	
Science Header	2.0	0.0	
Target Acquisition	1.5	1.5	
Scratch	0.2	0.2	X
Commands	2.0	3.0	?
Science Data	2.0	1.0	X
Growth	0.0	2.5	

A revised power budget is attached. The weight budget will be updated in March.

B. Schedule Section

The schedule contained in the January report remains unchanged. Milestones 1 through 4a due in February were completed. March milestones 5 through 9 are expected to be completed on schedule with the exception of number 5 which is impacted by the new weight directive. Milestone 7a was completed in February.

C. Problem Areas

The major problem at this time is the new weight limit.

The problems reported last month continue to be items of concern except for financial reporting which has been considerably improved. It will continue to be monitored for further improvements.

D. Science Section

A response to the GSFC STSOP confirmation report was submitted in late February.

An off the shelf PMT has been selected and will be incorporated in the design.

Additional comments on the HSP error budget were submitted in February and are included as an appendix.

E. Documentation Section

A preliminary DM-01 was prepared for delivery and would have been hand carried to the February 21 six week review at GSFC. The review was cancelled because of the weather and DM-01 held for inclusion of the latest temperature monitor information. DM-01 submission is now scheduled for March 8.

HSP POWER BUDGET

3-5-79

SYSTEM POWER INPUTS AND DISSIPATIONS

Optical Detector Subsystem (ODS)

	MINIMUM			NOMINAL			MAXIMUM	
	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Component Dissip.
HVPS (η = 0.85)	(1928)	-	(1834)	(2004)	-	(1846)	(2100)	-	(1860)
HVPS - 5 units	9640	-	9171	10020	-	9228	(10500)	-	9300
IDT Assembly									
Divider	-	-	(94)	-	-	(158)	-	-	(240)
Focus Coil	-	-	(954)	-	-	(1177)	-	-	(1425)
X Deflection Coil	-	-	(0)	-	-	(11)	-	-	(43)
Y Deflection Coil	-	-	(0)	-	-	(12)	-	-	(49)
Preamp	-	(140)	(140)	-	(140)	(140)	-	(140)	(140)
IDT Assembly Total	-	(140)	(1188)	-	(140)	(1498)	-	(140)	(1897)
IDT Assemblies (4 units)	-	560	4752	-	560	5992	-	560	7588
PMT Assembly									
Divider	-	-	(94)	-	-	(158)	-	-	(240)
Preamp	-	(140)	(140)	-	(140)	(140)	-	(140)	(140)
PMT Assembly Total	-	140	234	-	140	298	-	140	380
ODS TOTAL	9640	700	14157	10020	700	15518	10500	700	17268

	MIN			NOM			MAX		
Detector Electronics Assemblies									
Pulse Amp. Discr.(PAD)	-	(1080)	(1080)	-	(1080)	(1080)	-	(1080)	(1080)
C-V/Digitizer	-	(1545)	(1545)	-	(1545)	(1545)	-	(1545)	(1545)
Focus Amp.	-	(2340)	(1386)	-	(3120)	(1943)	-	(4425)	(3000)
Deflection Amps (2)	-	(990)	(990)	-	(1485)	(1462)	-	(2640)	(2548)
Detector Controller	-	(4300)	(4300)	-	(4300)	(4300)	-	(4300)	(4300)
Detector Electronics (IDT) Total	-	(10255)	(9301)	-	(11530)	(10330)	-	(13990)	(12473)
Detector Electronics (IDT)-4 units	-	41020	37204	-	46120	41320	-	55960	49892
Pulse Amp. Discr.(PAD)	-	(1080)	(1080)	-	(1080)	(1080)	-	(1080)	(1080)
C-V Digitizer	-	(1545)	(1545)	-	(1545)	(1545)	-	(1545)	(1545)
Detector Controller	-	(4300)	(4300)	-	(4300)	(4300)	-	(4300)	(4300)
Detector Electronics (PMT) Total	-	6925	6925	-	6925	6925	-	6925	6925
Detector Electronics Assemblies Total	-	47945	44129	-	53045	48245	-	62885	56817
System Controller	-	22400	22400	-	22400	22400	-	22400	22400
Power Converter and Distribution Subsystem									
Status Logic	-	32	32	-	32	32	-	32	32
Detector Supply (IDT)	(12994)	-	(2599)	(14588)	-	(2918)	(17663)	-	(3533)
Detector Suuply (IDT)-4 units	51975	-	10395	58350	-	11670	70650	-	14130
Detector Supply (PMT)	8831	-	1766	8831	-	1766	8831	-	1766
Digital Supply	28040	-	5608	28040	-	5608	28040	-	5608
Preregulator	-	-	17382	-	-	18572	-	-	20827
PCDS Total	88846	32	35183	95221	32	37648	107521	32	42363

	MIN	NOM	MAX
Spacecraft Power Input			
Total preregulator output	98496	105241	118021
Spacecraft power input (assume 0.85 efficiency)	115878	123813	138848
Secondary DC Power Balance			
Preregulator power available for secondary DC supplies	88846	95221	107521
Secondary DC available (assume 0.80 efficiency)	71077	76177	86017
Secondary DC Loads			
IDT assemblies	700	700	700
Detector electronics	47945	53045	62885
System controller	22400	22400	22400
PCDS	32	32	32
Total Secondary DC Load	71077	76177	86017
Dissipation Power Balance			
HSP (less RIU) power input	115878	123813	138848
ODS	14157	15518	17268
Detector electronics	44129	48245	56817
System controller	22400	22400	22400
PCDS	35183	37648	42363
Subassembly Totals	115869	123811	138848

Nominal Power for Various Operating Modes (not including RIU/EU)

Common electronics	32988
PMT Detector	12748
IDT Detector (each)	19520

CHANGES FROM PREVIOUS BUDGET

(for nominal values only)

	Input Power			Bus Power
Item	Was	Is	Increase	Increase
HVPSs	5279	10020	4741	5578
Preamps	700	700	0	0
PADs	5400	5400	0	0
C-V/Digitizers	7725	7725	0	0
Defl.Amps	5940	5940	0	0
Focus Amps	12480	12480	0	0
Det.Controller	29270	21500	(7770)	(11426)
System Controller	22686	22400	(286)	(421)
PCDS	32	32	0	0
			TOTAL	(6269)
		Bus Power Increase*		(6270)
		Previous Bus Power		130083
		Present Bus Power		123813

* Difference due to roundoff error.

CONTINGENCY

* Allowable SI Power	145000
* Less RM/EU Power	5000
Allowable HSP Power	140000
Present HSP Power	123813

Contingency (140000/123813-1)x100 = 13.07%)
(NOTE: this contingency is based on all five detectors operating)

* Per Decision #6, 18 Nov. 1978 Management Meeting.

Notes:

1. All power given in milliwatts.

2. Minimum, nominal, and maximum values are based on operating conditions of nominal units only. Does not include unit-to-unit variations.

3. Operating conditions, with all detectors simultaneously powered, will be such that the total power consumption will rarely exceed the totals for nominal in the above budget.

4. Values given in parentheses are non-add subtotals.

Comments on HSP Error Budget

The error budget (December 1978 monthly report) has been organized into three sections. 1) Those factors affecting both pulse counting and current measurements, including

ST pointing error and jitter

HSP optical bench deformation caused by changes in the overall temperature of the bench. (Effects of temperature gradients will be evaluated after the NASTRAN analysis of the HSP structure is complete this Spring).

image dissector deflection and focus drift, deflection quantization, effect of external magnetic fields, and cathode non-uniformity.

2) Gain and noise errors in current measurements

detector gain change due to high voltage drift with time and temperature

dark current drift and noise

current-to-voltage converter gain/offset drift and noise; quantization error.

3) Gain and noise errors in pulse counting measurements

pulse amplifier deadtime correction error resulting from the uncertainty in the deadtime

signal and dark count rate change as consequence of threshold drift.

Obviously the relative importance of these errors depends upon the purpose and circumstances of the observation being carried out. For example, is the purpose to make a "yes-no" detection of an extremely faint object (in which case sky background and possible dark count are important so that the result depends strongly on the wavelength band and location of the object in the sky with respect to the Milky Way, zodiacal light, etc); is the purpose to search for the smallest observable change in brightness (for which the result depends upon the time scale of the variability, on whether or not the observation can be made by pulse counting or by DC and if the former, the size, if any, of the deadtime correction, etc); or is it desired to make a magnitude transformation over a large magnitude range, etc, etc. Several such cases are being defined now and the results will be available in the fairly near future.

Analysis done so far indicates three factors which may be of some significance under particular circumstances: a drift in detector high volts and thus in detector gain (important for current measurements and therefore for bright objects); uncertainty in the deadtime and consequently in the deadtime correction (important in the

bright end of the pulse counting regime); and possibly the change in dark count (of consequence only when observing the faintest objects against the faintest possible sky).

One can get a feeling for how some of these things go by considering the following basic observation: a one color star-sky measurement by pulse counting for a time less than one orbital night (so that no ST motion is required). The optical bench temperature would be expected to remain constant over such a time to $\leq 0.2°C$. As s result, the star image diameter on the filter will change by about 0.1% and the image will move across the filter by about 1μ ; the change in the light bundle at the relay mirror is also completely negligible. The longitudinal motions of the aperture plate, relay mirror, and detector cathode result in a net change in the image diameter on the cathode of less than 1% (or $\sim 1/2\mu$). Note that these changes are not greater than those introduced by the ST pointing jitter of $\pm 0.007''$, which corresponds to $\pm 2\mu$ in the ST focal plane and $\pm 1.3\mu$ at the IDT cathode.

Now consider the HSP performance specification (II.A.2.3 in the description of the photometer) having to do with limiting magnitude, i.e. that the photometer be capable of reaching 24^m in the visual with S/N ≥ 10 in 2000 seconds. Half of this time would be spent on the star, half on the sky. No spacecraft motion would be required during the observation and from the previous discussion and an examination of the data given in the HSP error budget, one can show that photon noise sets the limit on the precision of the observation. Assuming the ST optical throughput as given in the AO, an HSP efficiency of 0.09, a 500A filter, 80% transmission, the use of the $0.4''$ aperture, and a visual sky of 22.5 mag/sec^2, one finds a 24^m star produces ~ 250 counts in the HSP in 1000 seconds while the sky and dark count produce ~ 140 counts in 1000 seconds. Thus the signal-to-noise ratio is ~ 12.5.

Next consider the linearity specification for the HSP (paragraph g) applied first to a comparison of a very faint star with one 10^6 times brighter, e.g. 25^m and 10^m (visual) stars, respectively. The faint star produces 100 counts in 10^3 seconds, the background counts are the same as given in the previous paragraph and S/N ~ 6. Photon noise is completely negligible from the bright star after only a few seconds integration and the count rate of 10^5/sec requires a deadtime correction of <1% so that any uncertainty in the correction is small. Furthermore, since this star is so bright it could be observed in the daytime portion of the orbit, only a short time after the faint star; thus time and temperature change effects should be negligible. The only new element here is a change in ST pointing, which is specified to $\pm 0.01''$ or $\pm 2.8\mu$ in the focal change, again negligible. Thus there appears to be nothing which would increase the error by 1.3x the combined statistical photon noise.

Finally, compare two equally bright stars just within the lowest six decades of dynamic range, e.g. two 10^m (visual) stars. Here photon noise and sky background are completely negligible after only a few seconds of measurement. Presumably the two objects could be observed during a time interval of minutes during which the HSP environment would scarcely change. If the deadtime is known to 10% (which seems reasonable), the uncertainty in the deadtime correction (which appears to be the largest contributor to the measurement error) would be $\sim$ 0.06% and the combined uncertainty in a comparison of the two stars would be <0.2%, as specified.

Finally, the saturation specification (paragraph f) is easily met with the type detector used in the HSP. To achieve a S/N = 4000, 16×10^6 pulses must be counted in a time short compared to any time scales associated with changes in HSP performance. The 10^m star described above would produce $\sim 3 \times 10^7$ counts in 5 minutes, a comfortably short time to meet the specification.

Don Johnson
file

DR-MA-02 Number 13
Issued: May 4,1979

Monthly Report

for

April 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

A parts and materials list for the Image Dissector Tube Assembly was received from ITT in March and submitted to GSFC for review. Most details of the mechanical and electrical interface to the tube assembly have been worked out. A PDR has been tentatively scheduled in Fort Wayne for late May.

Interface definition has also made progress on the HVPS. Connectors have been specified and electrical interface details defined. A PDR date for the HVPS will be agreed upon in early May.

The preregulator section of the PCDS has been breadboarded and tested at Collins. The preregulator is 85% efficient, has 30 mV output voltage change no load to full load, no measurable output voltage change over temperature (-55 to +100°C) and no change after two weeks operating time. The mechanical interface and connector locations have been specified. Design work is progressing on the regulated supplies. The detailed mechanical and thermal design is just beginning. A tentative date has been selected (May 30) for the PDR.

The pre-layout review (PLR) for the pulse amplifier/discriminator was held on April 12. The review identified the need for additional temperature tests of the breadboard. The temperature stability of the threshold and gain meet the specification but with little margin. As a result of the review and additional tests, compensation is being added to improve the temperature stability by a factor of two. Work is progressing on the PAD PWB layout. The only remaining layout concern is the method of conductively heat sinking one TO-5 transistor which is not detailed at this time.

Because of the additional effort required on the PAD and the need to perform some additional deflection amplifier tests prior to the deflection amplifier/CVC (current to voltage converter) PLR, the PLR date was changed to May 10. The only item of concern is the late delivery of a low leakage FET which is compromising the completion of CVC breadboard tests. The FET delivery is now expected in early May in time to support the review.

Additional manpower has been applied to the digital electronics effort (DCP in the schedule, a combination of the system controller and detector controller). The status of work completed at the end of April was somewhat ahead of the mid April schedule update. Schematics have been completed and wire wrap layouts and lists for the DCP breadboard (wirewrap board version) have been started. A review (a pre-PLR or P^2LR) has been scheduled for May 9. (The DCP PLR will be held prior to the start of multilayer board layout which occurs after breadboard (wirewrap) tests are complete. The May 9 review is a review of design prior to completion of the wirewrap layout).

Additional manpower has been added to the GSE design effort. The present schedule contains major changes in the GSE schedule which is now more realistic. Work is progressing on subsystem design and subsystem interface definition. The major concern in the GSE area is the need for technician support which has not been located as of the end of April. It now appears that this need will be filled in May.

NASTRAN structural modeling effort continued during April at A.O. Smith. Our mechanical engineer was in residence at A.O. Smith two or three days each week. The box beam and baseplate have been modeled in detail and stresses and deflections calculated. Several iterations have been made in the design to improve stiffness, reduce optical bench deflection and overall stresses, and to reduce weight. The major improvement was the addition of some diagonal members to the electronics baseplate. A GSFC STSOP representative visited SSEC in late April to review the mechanical/structural design and also visited A.O. Smith to review the status of the NASTRAN model. A status review with A.O. Smith is scheduled for May 8.

Our response to the direction to reduce HSP weight to 513 lbs was not accepted in April. (Telephone approval of our present weight of 529 lbs was received May 1). There was some additional effort made to reduce HSP weight. We have asked for clarification of the 513 lb number since 600 ÷ 1.15 = 521 and 513 lbs represents a 17% contingency, not 15%.

There has been little thermal model activity in April due to the NASTRAN structural model iterations and the need to obtain subsystem details to support a more detailed thermal model. In response to GSFC STSOP direction, the HSP hold mode power was increased from 37 watts to 50.3 watts to provide margin between the calculated and ICD limits on interface temperatures. There was almost no margin with the 37 watt hold mode; some inner surface temperatures were -19°C in the model. The model now indicates a 10°C margin with the 50.3 watt hold mode. It should be emphasized that thermal margin may be traded for hold mode power if 50 watts is determined to be excessive. The present thermal model was delivered (in HEAT format) to GSFC, LMSC, and PE in April.

B. Schedule Section

A representative of GSFC STSOP visited SSEC in late April to review overall program status, financial reporting, and schedule. The schedule was revised and milestones renumbered to facilitate input to the GSFC milestone tracking computer program. The milestone number convention shown in the present schedule is that dashed numbers(i.e.16-1, 16-2 etc) are used to identify each input to a node and letters (3a,8a) are used to identify milestones which have been subdivided to display greater detail. The revised schedule chart and milestone status list are attached.

C. Problem Areas

The C&DH ICD remains an item of concern because of the lack of a software section. The time required by IBM to distribute the revised ICD as agreed upon by the C&DH IFWG members is also an item of concern.

The definition of scans in the PCS section of the SI to OTA/SSM ICD remains an item of concern.

D. Science Section

The layout of the optical detector subsystem (ODS) continued in April. The

details of the PMT location, mounting, and associated optics are now being worked out.

Dr. Schroeder will visit in early May to update the optical design calculations to reflect the present ODS layout.

An engineering evaluation aperture plate and filter support structure were fabricated in April. The aperture plate and filters are held by a small tube-like assembly. This assembly will subsequently be vibration tested with sample filters installed.

A sample of MgF faceplate material was received in April for radiation response tests.

A preliminary HSP filter list (attached) has been written and sent to the team members for review and comment. The next team meeting will be in Madison on May 17 and 18.

E. Documentation Section

The serial command section of DR-DM-01 is being revised and will be issued when complete.

The thermal math model (SE-03) was delivered to GSFC, LMSC, and PE in April.

The monthly and quarterly financial reports (MA-04) are the subject of a continuing improvement effort. The last reports submitted complied with all GSFC requests for modifications and additions to the format. Work has begun on a small program to take the present accounting data and present it in various formats which will facilitate budget updates and preparation of more accurate 533Q reports in less time.

F. CCB Activity

The following is a summary of HSP CCB activity in April:

1. STR-02A PSCN Status

PSCN 15	HSP Action-- Accepted-no impact	RECP 0005

2. SI to OTA/SSM PIRN Status

PIRN	HSP Action	
2004	Accepted - no impact	2200-219 (4/18)
3003	Comments submitted to LMSC, no response received--our response due 11 May, will be same as earlier response -- not acceptable without further explanation	

3. ECP Status

Number	Item	Date Submitted	Status
1	Subcontract costs	4/13/79	Awaiting STSOP action
2	C&DH Simulator environ. control	4/13/79	Telephone approval, CCR copy received
3	Thermal interface	4/13/79	Awaiting STSOP action
4	Weight reduction	4/13/79	Awaiting STSOP action

Prèliminary HSP Filter List (Image Dissectors)

(Intermediate and Broadband)

λ	Δλ	Remarks
1150A	± 50A	Excludes Ly α; very tentative
1300	+100 - 50	Excludes Ly α; FOC
1550	± 25	C IV; FOC; WFC
1550	±150	continuum; tie-in with OAO-2 and ANS photometry; FOC; WFC
1640	± 25	He II
1700	±150	These three filters define interstellar extinction bump;
2175	± 50	λ 1700 and λ 2600 give a temperature - sensitive, very nearly
2600	±150	extinction - independent index.
2800	± 25	Mg II
2800	±150	continuum; WFC
3300	±150	tie-in with OAO-2 and ANS photometry; better than 'U' filter since shortward of Balmer jump.
B		WFC
v		Stromgren-Crawford; FOC
b		Stromgren-Crawford; FOC
Hβ	± 25	WFC, FOC
V		WFC
y		Stromgren-Crawford; FOC
R		Poorly defined; WFC, FOC, and HSP should try for similar filters

(Polarimetry)

2100	±100	Shortest λ possible with polacoat
2175	± 50	Extinction peak
2600	±200	With two shorter λ filters get behavior of polarization over extinction bump
2800	±200	
3000	±200	
3300	±200	Overlap with ground ('N' filter)

(Very Broadband) for 10 arc sec apertures

λ1150 - λ3000 (CsTe)
λ1900 - λ3000 (suprasil on CsTe)
λ1900 - λ7000 (suprasil on MA-1)

Photomultiplier (occultations)

Blue (beam-split to IDT)
Red (methane band)
} TBR

HSP MILESTONE STATUS 4/27/79 (Corrected 5/1/79)

MSTONE	NEW XX CHANGE X	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
3a	XX	5/14	Order PMT		5/14	
6	X	3/7	Optical parts specified		5/14	Not critical
8		3/12	DCP BB design	4/10		
8a		6/4	DCP wirewrap list compl		6/4	
9	X	3/29	Optical parts ordered		5/28	Not critical
10		4/2	Coarse NASTRAN results	4/11	4/16	
11		4/4	BB tests complete	4/20	4/20	
12		4/5	Prelim.subsyst.box design	4/16	4/16	
13	XX	5/9	RIU,DMA parallel I/F design		5/9	
13a	XX	5/23	Science interface design		5/23	
14	X	4/4	Cable layout		5/7	Subcon.details needed
15		4/9	PAD PLR	4/12	4/12	
16a	X	5/3	CVC, defl.amp.PLR		5/10	Reschedule
16-1		4/17	DCP BB		6/25	
16-2		4/17	DCP BB test box		6/25	
16-3		4/17	DCP test software		6/25	
17	X	4/17	IDT PRR		TBR	Will be reskd
18		5/4	NASTRAN-detailed model		6/11	
19		5/4	DEA box design		5/4	
19a		5/21	Pwr Distrib.Unit box design		5/21	
19b	X	5/7	Signal Distrib.Unit box design		5/30	Re-eval.of nec manpower
19c		8/6	System controller box design		8/6	
19d		6/10	Preamp. box design		6/10	
20-1	XX	6/25	PWB layout compl.for CVC and defl.amp.		6/25	
20-2	XX	6/25	PWB layout complete for PAD		6/25	
21		5/14	Detailed mech.design		6/25	

22		5/22	Flt parts ordered	5/22
23		5/28	DCP hardware debugged	7/9
24		5/29	Cable harness layout complete	5/29
25-1	XX	8/2	Fab. RIU, DMA,parallel interface	8/2
25-2	XX	8/2	Fab. science interface	8/2
25-3	XX	8/2	Fab. PBS, TCB	8/2
25-4	XX	8/2	GSE software	8/2
26		7/2	GSE subsystem tests	8/19
27-1	XX	7/9	EM parts received	7/9
27-2	XX	7/9	PWB received	7/9
27-3	XX	7/9	DEA boxes received	7/9
27-4	XX	7/9	PDU box received	7/9
27-5	XX	7/9	SDU box received	7/9
2	XX	7/9	Preamp. box received	7/9
28-1	XX	7/23	GSE hardware complete	8/2
28-2	XX	7/23	HSP EM software	8/2
29		8/6	DCP software debugged	8/6
30		8/6	EM subsystem complete	8/6
31		8/15	HVPS EM received	10/16
31a		8/15	IDT EM	11/12
31b		12/14	IDT/HVPS test complete	12/14
32		8/15	TSU shipping container design	8/15
33		8/20	TSU mass simulator	8/20
34-1	XX	8/29	DCP BB test complete	8/29
34-2	XX	8/29	Syst.controller wire harness design	8/29
35		9/4	GSE test complete	9/23
36-1	XX	9/4	Test EM subsystem	9/4
36-2	XX	9/4	EM cable harness	9/4

37-1	XX	9/4	Fab. TSU structure	9/4	
37-2	XX	9/4	Build TSU handling fixture/sling	9/4	
38	unchanged				
39-1	XX	10/1	EM hardware integrated	10/1	
39-2	XX	10/1	EM software complete (8080)	10/1	
40	unchanged				
41-1	XX	10/17	Build TSU subsyst.mass simulator	10/17	
41-2	XX	10/17	TSU structure/wire	10/17	
42	unchanged				
43-1	XX	11/20	Integrate TSU	11/20	
43-2	XX	11/20	Fab. TSU shipping container	11/20	
43-3	XX	11/20	TSU GSE built	11/20	
44-1	XX	12/3	Fab. of syst.controller box compl.	12/3	
44-2	XX	12/3	Fab. MLB	12/3	
45-1	XX	12/17	EM IDT installed	12/17	
45-2	XX	12/17	EM PCDS installed	12/17	
45-3	XX	12/17	Initial test EM complete	12/17	
46	unchanged				
47-1	XX	1/23/80	EMI tests EM	1/23/80	
47-2	XX	1/23/80	EM DCP test complete	1/23/80	
48	unchanged				
49	X	6/15	PBS,TCB design complete	7/2	M'stone 13a
52	XX	5/9	DCP PPLR	5/9	
53	XX	6/20	TSU handling fixture/sling design	6/20	
50	XX	7/16	Star Sim. electrical design	7/16	
51	XX	8/27	Star Sim. electr. fab. complete	8/27	

1979 | 1980

APRIL 16 23 30 | MAY 7 14 21 28 | JUNE 4 11 18 25 | JULY 2 9 16 23 30 | AUGUST 6 13 20 27 | SEPTEMBER 3 10 17 24 | OCTOBER 1 8 15 22 29 | NOVEMBER 5 12 19 26 | DECEMBER 3 10 17 24 31 | JANUARY 7 14 21 28 | FEBRUARY 4 11 18 25 | MARCH 3 10 17 24

ST/[illegible]

VA[illegible] / HOLI[illegible]

REVIEWS / MEETINGS

DETECTORS
IDT

PMT

FILTERS / MIRRORS

ANALOG ELECTRONICS

BOX DESIGN

DIGITAL ELECTRONICS

WIRE HARNESS

STRUCTURE /ODS

GSE

HVPS EM 20 → 31 R+I HVPS → 31A TEST IDT → 31B

IDT EM 20 → 17

ORDER PMT 259 → 3A → TO 27

SPECIFY ODS OPTICS 259 → 6 → ORDER → 9 → TO 36, 91

ORDER FAB PARTS → 22

CUC, DETL AMP 251 → 15A → PWB LAYOUT, CUC, DTL AMP L

EM PARTS 60

PWB LAYOUT PAD 251 → 20 FAB PWB 60 → 27 BUILD EM SUBSYST → 30 EM CONNECTORS → TEST EM SUBSYST → 36 INTEGRATE EM

EEE S/W 334 → 39 DEBUG EM → 42 INITIAL TEST - EM 60/20 → 45 EMI TEST EM 20 → 47 FINAL EM TEST 20 → 48 FAB FLT MLB / PWB

EM PODS 20 → 45

INSTALL IDT 60

EM PMA COMP 20 → CDR

DEA BOX DES 252 → 19 PDU → 19A SDU → 19B PRE AMP → 19D FAB EM BOXES 60

SYST CONTROLLER → 19C FAB SYST CON BOX 60

SCHEMATIC 251 → 52 WW LISTS → 8A FAB BB WW → 16 WDW DRW → 23 INT/DEBUG S/W → 29 FINAL BB TEST → 39 → TO 36

DCP TEST BOX 22 → DCP TEST S/W 39

MLDB LAYOUT → 40 FAB MLB 60 → 44 BUILD EM DCP 60 → 46 EM DCP TEST → 47

SYST CONTROLLER W.H. DESIGN

CABLE LAYOUT 251 → 14 CABLE HARN DESIGN → 29 EM CABLE HARNESS 60 → TO 36

NASTRAN MODEL 252 → 18 → SIMPLIFIED NASTRAN

DETAILED DESIGN → 21 DESIGN TSU HARDSIM 40 → 33 TSU HARDSIM FAB → RID TSU'S → 41 TSU STRUCTURE / WH ASSEMBLE

FAB STRUCTURE 40 → 37

TSU CONNECTORS

INTEGRATE TSU → 43 TEST TSU → SHIP TSU → TEST AT KSFC → TO 48

DESIGN TSU HANDLING FIXTURE / SLING 120 → 53 → BUILD TSU HANDLING FIXTURE / SLING 40

TSU MATE FITTINGS

DESIGN SHIPPING CONTAINER 40 → 32 → FAB TSU SHIPPING CONTAINER 40

DESIGN TSU GSE 40 → 38 → TSU GSE

TSU GSE CONNECTORS

RIU, DMA, 1553 I/F DES 120 → 13 DES SCI I/F → 13A DESIGN PBS, TCB → 49 *SIM → 50 *SIM FAB/TEST → 51 INT W/ [illegible] → 35 → TO 39

25 SUBSYST TEST → 26 INT → 28 DEBUG

GSE S/W 35

EM GSE CONNECTORS

EM S/W 25

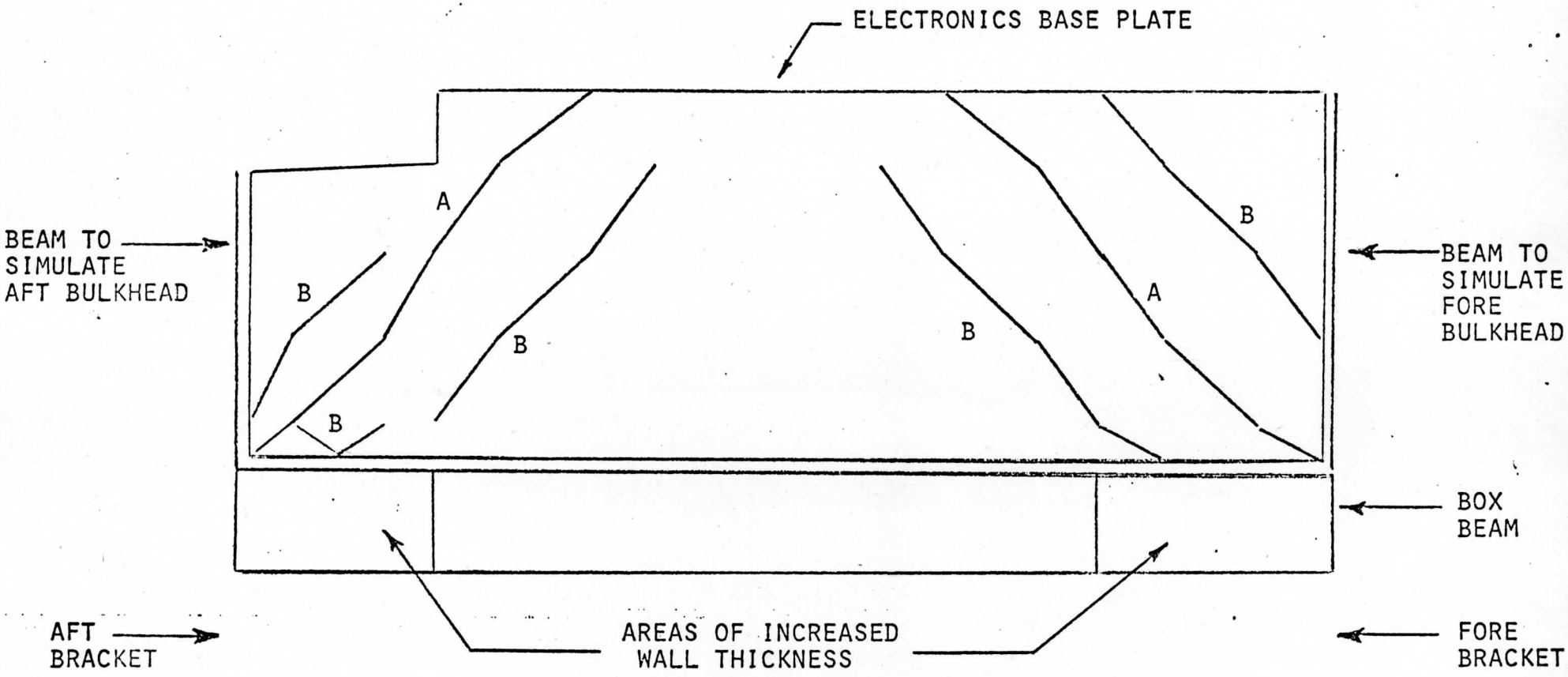
NOTE: WBS ELEMENT NUMBERS: XX

EE:[illegible] 4-27-79
5-4-79 REV

SPACE TELESCOPE HIGH SPEED PHOTOMETER

PRELIMINARY RUNS TO OBTAIN DESIRED AXIAL STIFFNESS

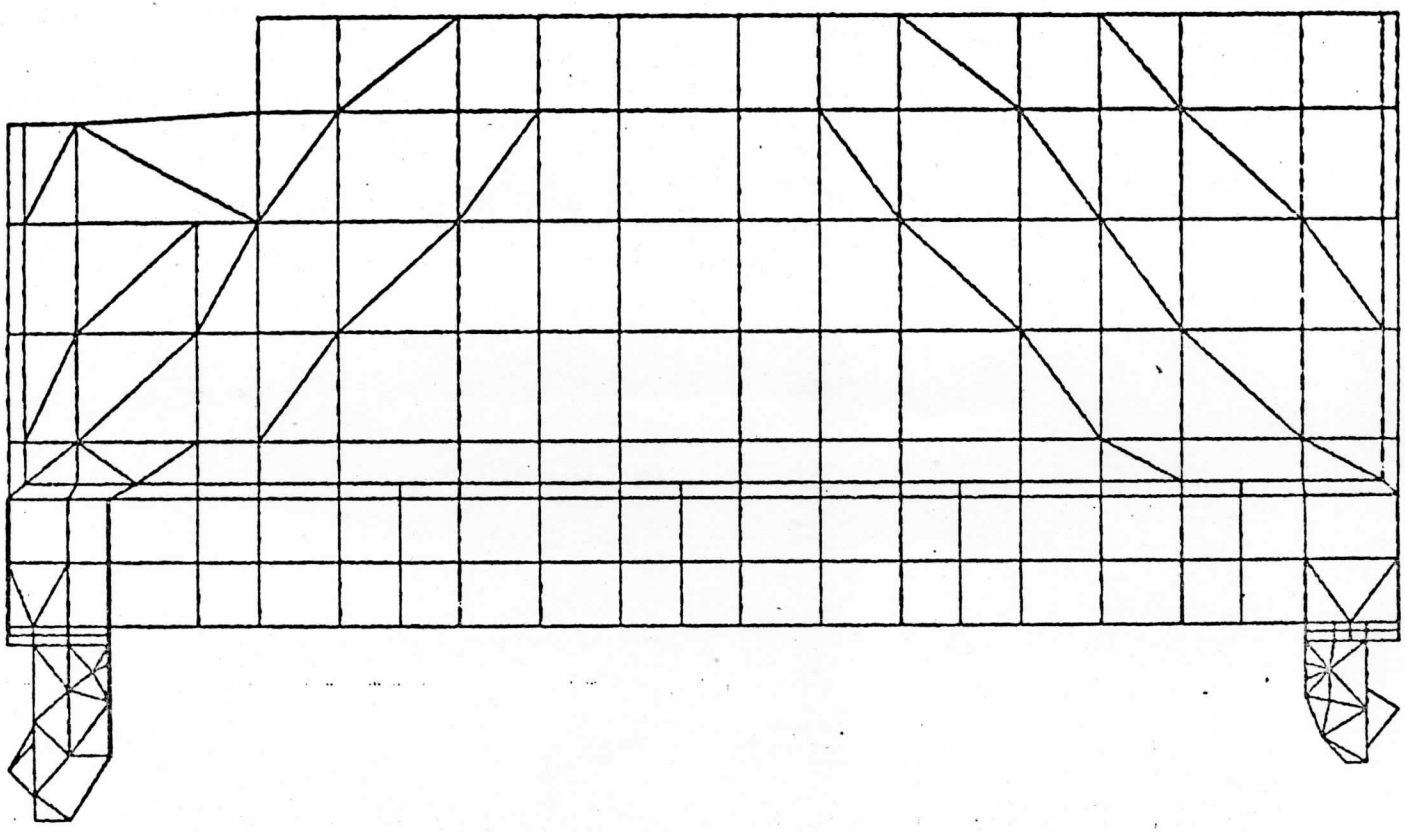
APPENDIX	CONFIGURATION	DATE	TITLE
A	1	4/11/79	Box Beam and Base Plate
B	2	4/17/79	Configuration 1 with fore and aft bulkheads simulated by beams
C	3	4/17/79	Configuration 2 with bracket stiffeners modified
D	4	4/18/79	Configuration 3 with vertical wall thickness of box beam in first and last bulkheads doubled
E	5	4/18/79	Configuration 4 with single line of diagonal bars in fore and aft bays
F	6	4/19/79	Configuration 5 with added diagonals
G	7	4/20/79	Configuration 6 with vertical walls of box beam at original thickness
H	8	4/20/79	Configuration 7 with thickened vertical walls in fore and aft bays



A - DIAGONAL BARS ADDED IN RUN 5

B - DIAGONAL BARS ADDED IN RUN 6

RX= -90. RY= -90. RZ= 0. GRAFAX 26-APR-79
ENTER A VIEW COMMAND:



APPENDIX A

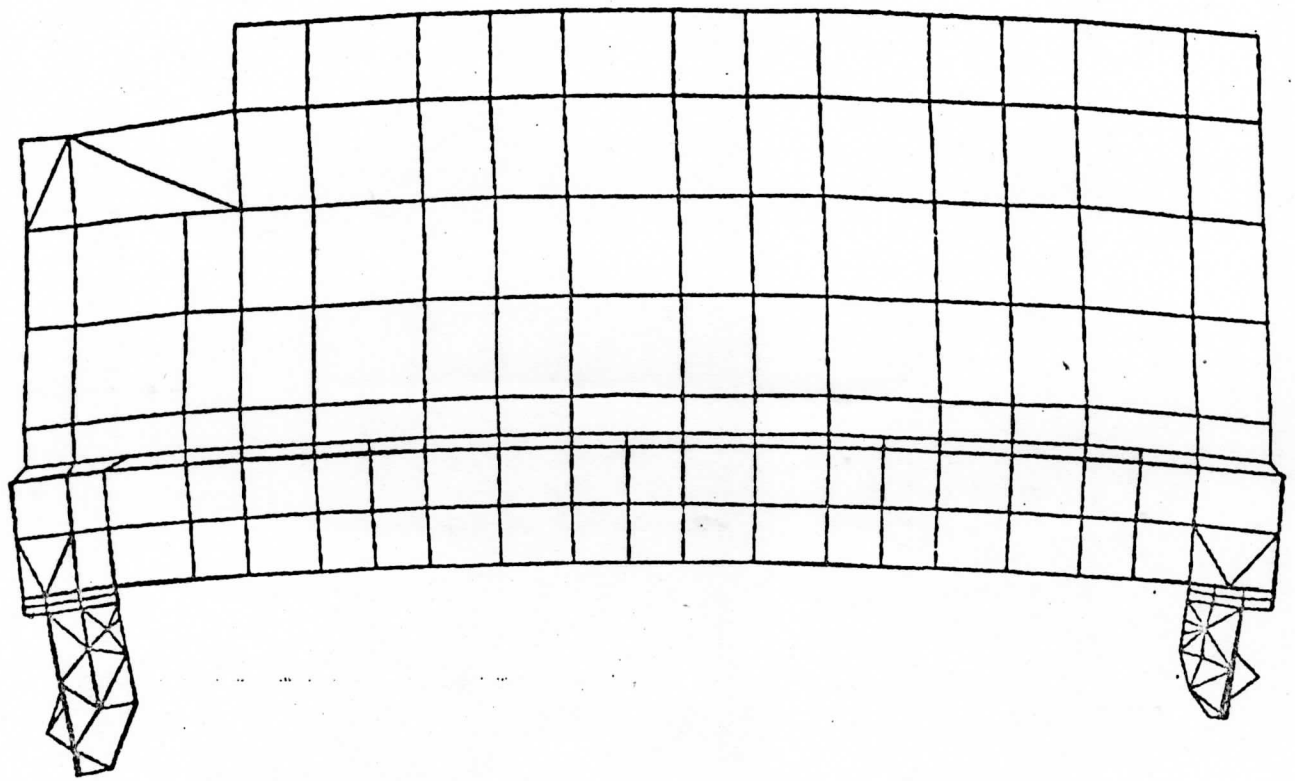
RUN 1

RESULTS

- k = 55,000 lb./inch
- Bar Elements in box beam stiffeners that are attached to brackets have high bending stress (3400 psi)
- Not much Axial Load in base plate, i.e., the load is not being transferred through the structure property

Run (1)

RX= -90. RY= -90. RZ= 0. GRAFAX 11-APR-79
SUBCASE 1 MAXD -0.023688
ENTER A VIEW COMMAND:



APPENDIX B

RUN 2

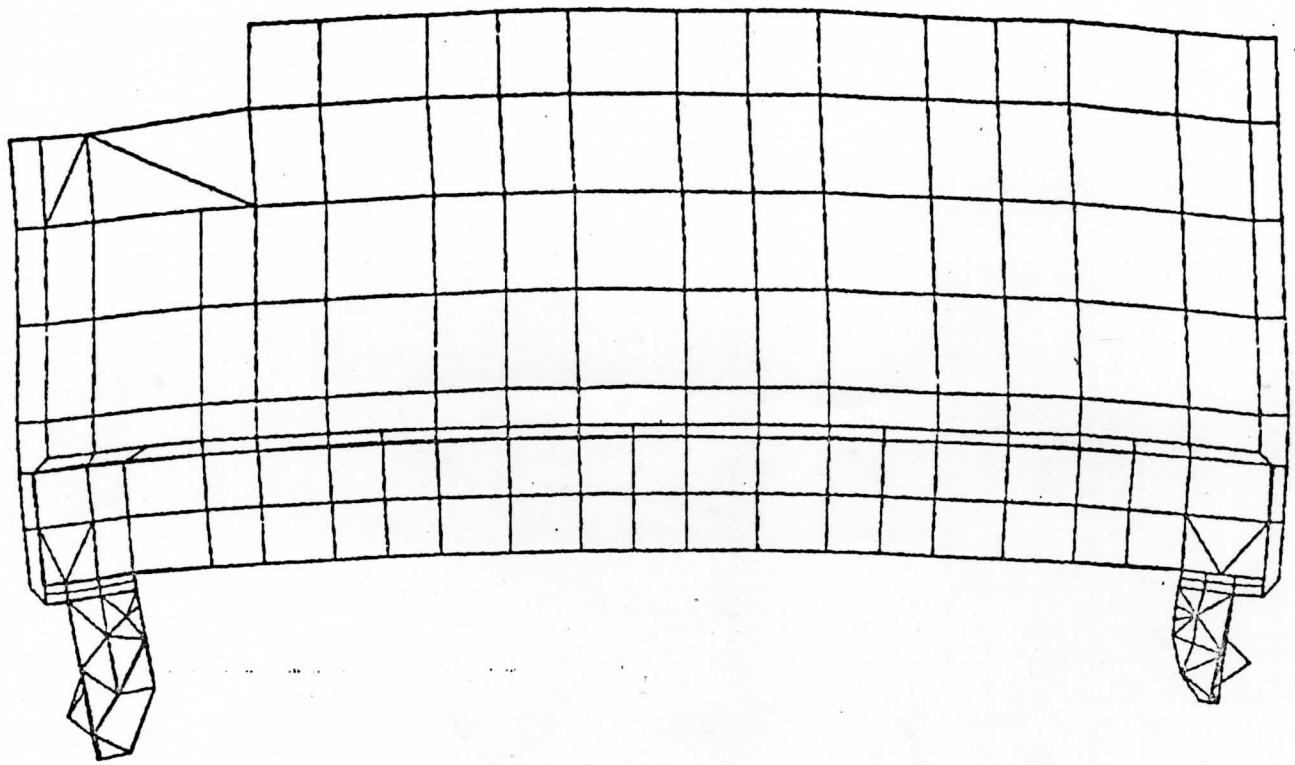
MODEL CHANGES FROM RUN 1

- Beam Elements added along both ends of base plate to simulate fore and aft bulkheads and to see if more load can be transferred into the base plate

RESULTS

- k = 56,730 lb./inch
- More local deformation at bracket area due to increased effective stiffness of base plate

RX= -90. RY= -90. RZ= 0. GRAFAX 26-APR-79
SUBCASE 1 MAXD -0.022683
ENTER A VIEW COMMAND:



APPENDIX C

RUN 3

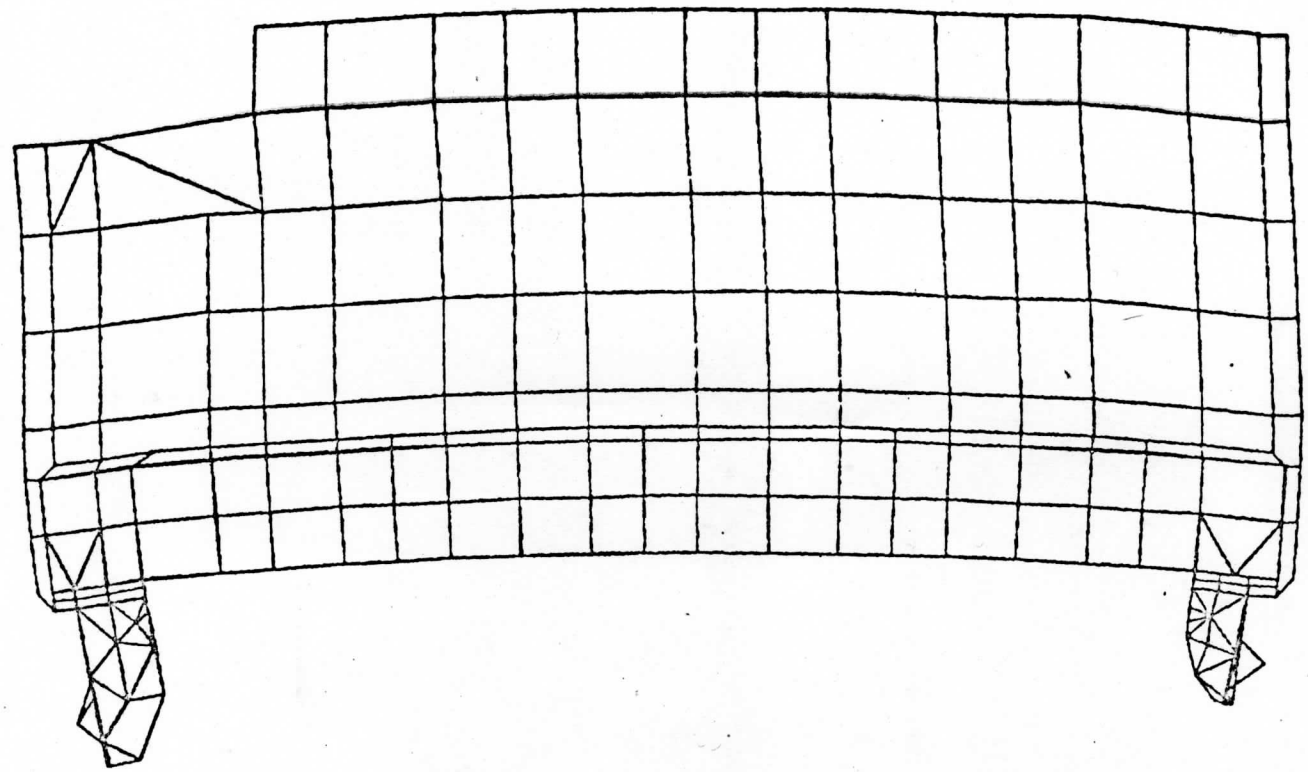
MODEL CHANGES FROM RUN 2

- Box beam stiffeners that the brackets attach to were stiffened to try and decrease local bracket deformation.

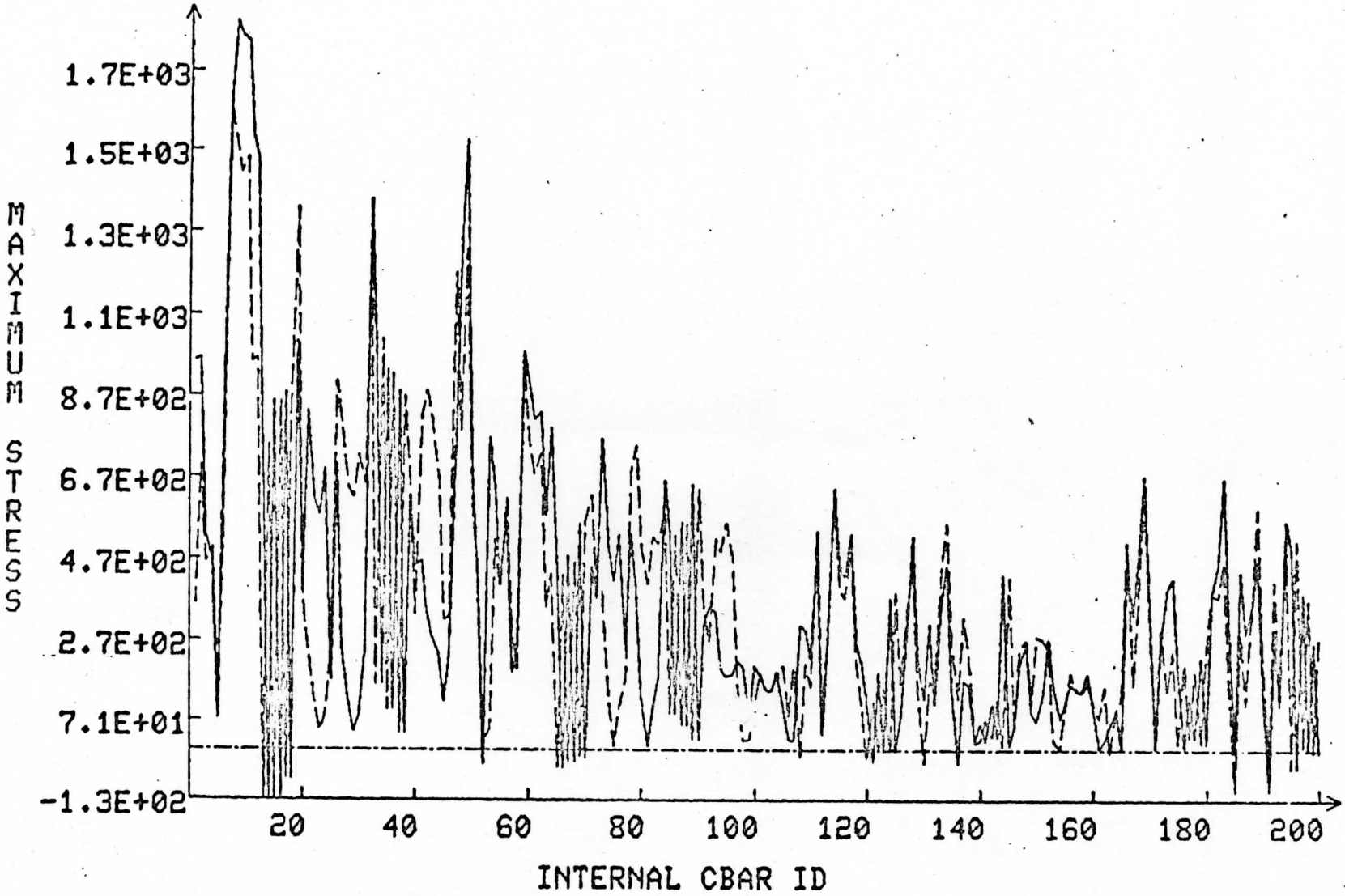
RESULTS

- k = 58,200 lb./inch
- Little change in local deformation
- Load still not transferring to base plate

RX= -90. RY= -90. RZ= 0. GRAFAX 17-APR-79
SUBCASE 1 MAXD -0.022147
ENTER A VIEW COMMAND:

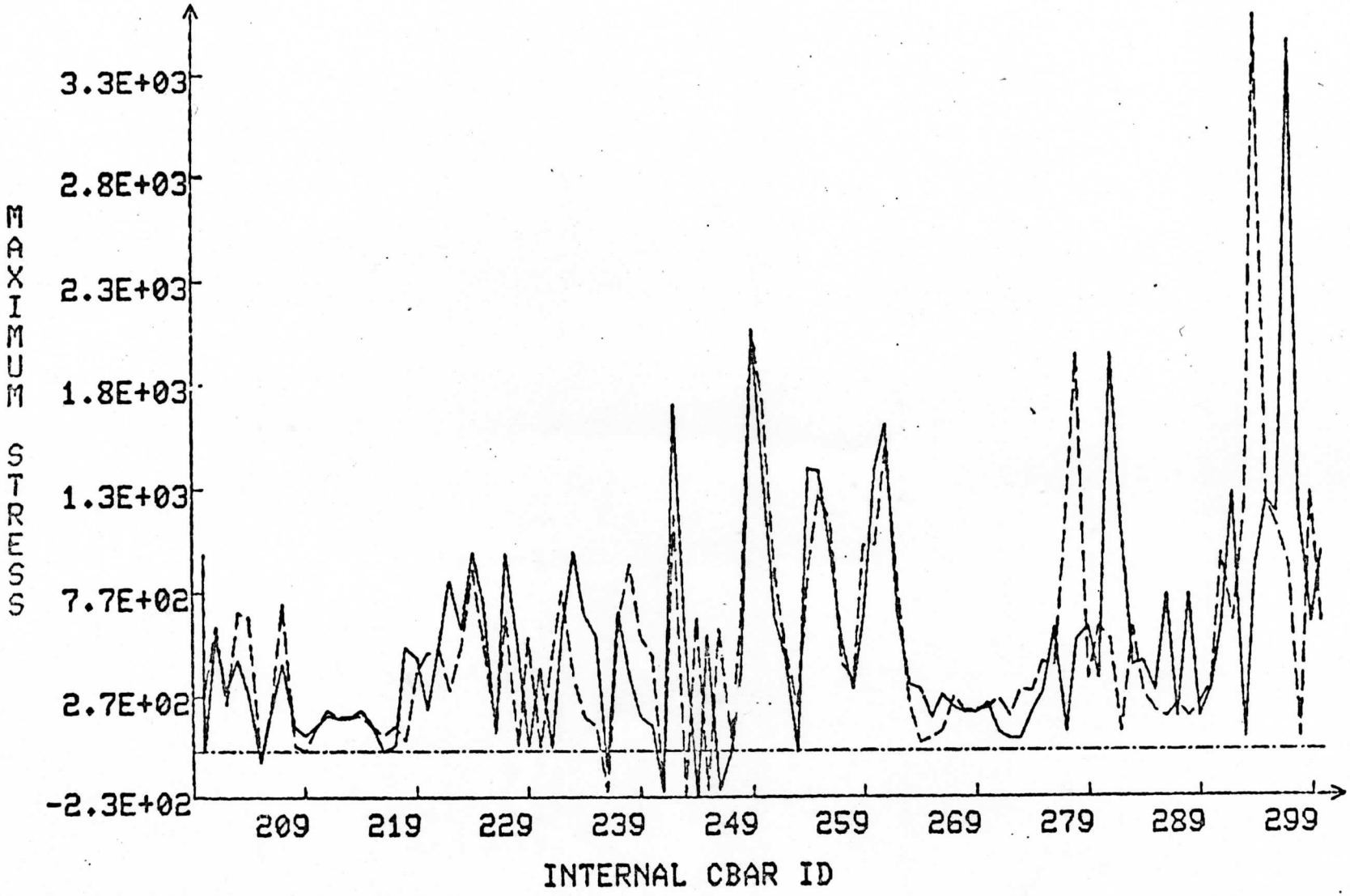


AOS GRAFAX SUBCASE 1 17-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 3



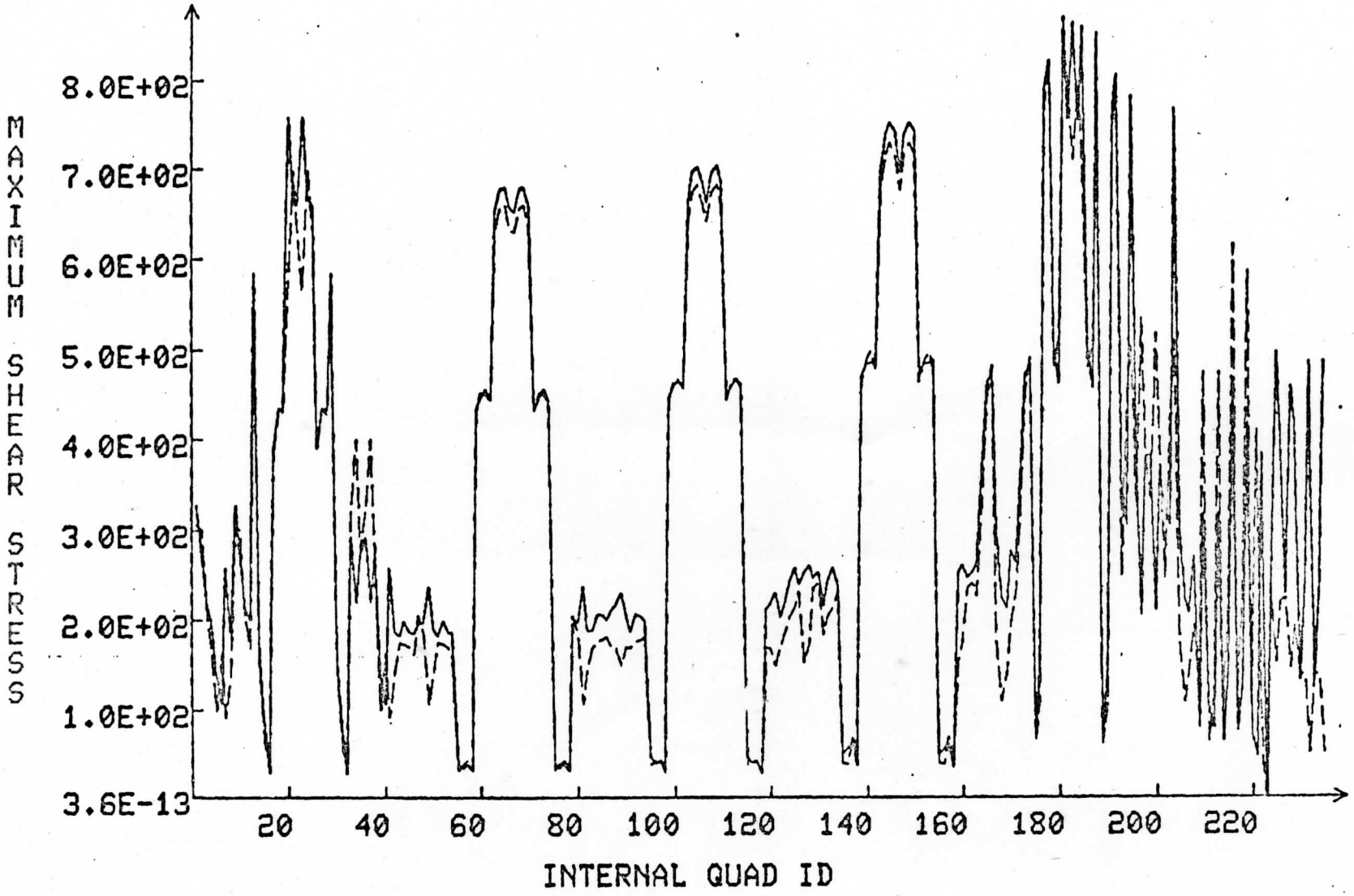
ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 17-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 3



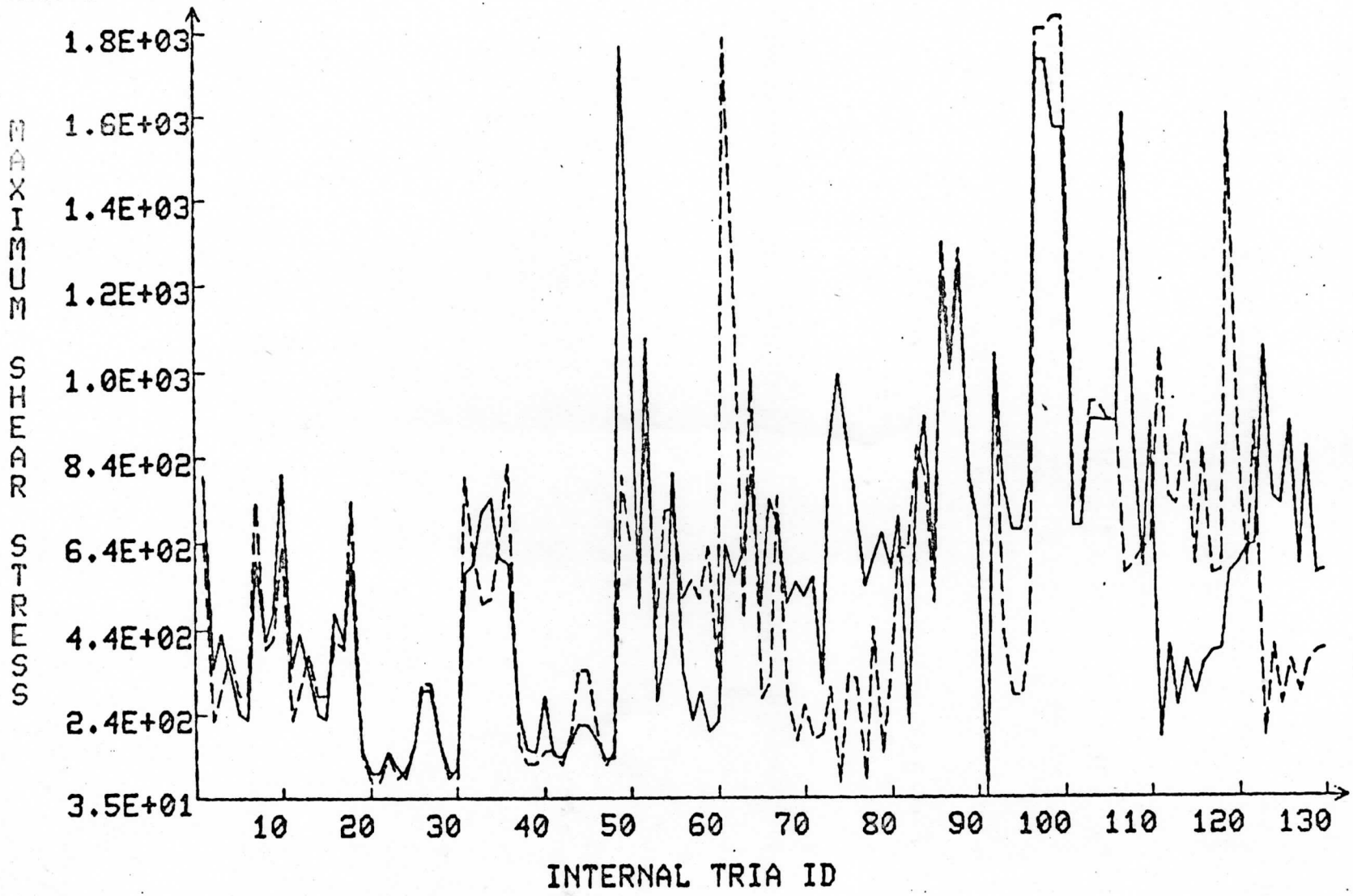
ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 17-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 3



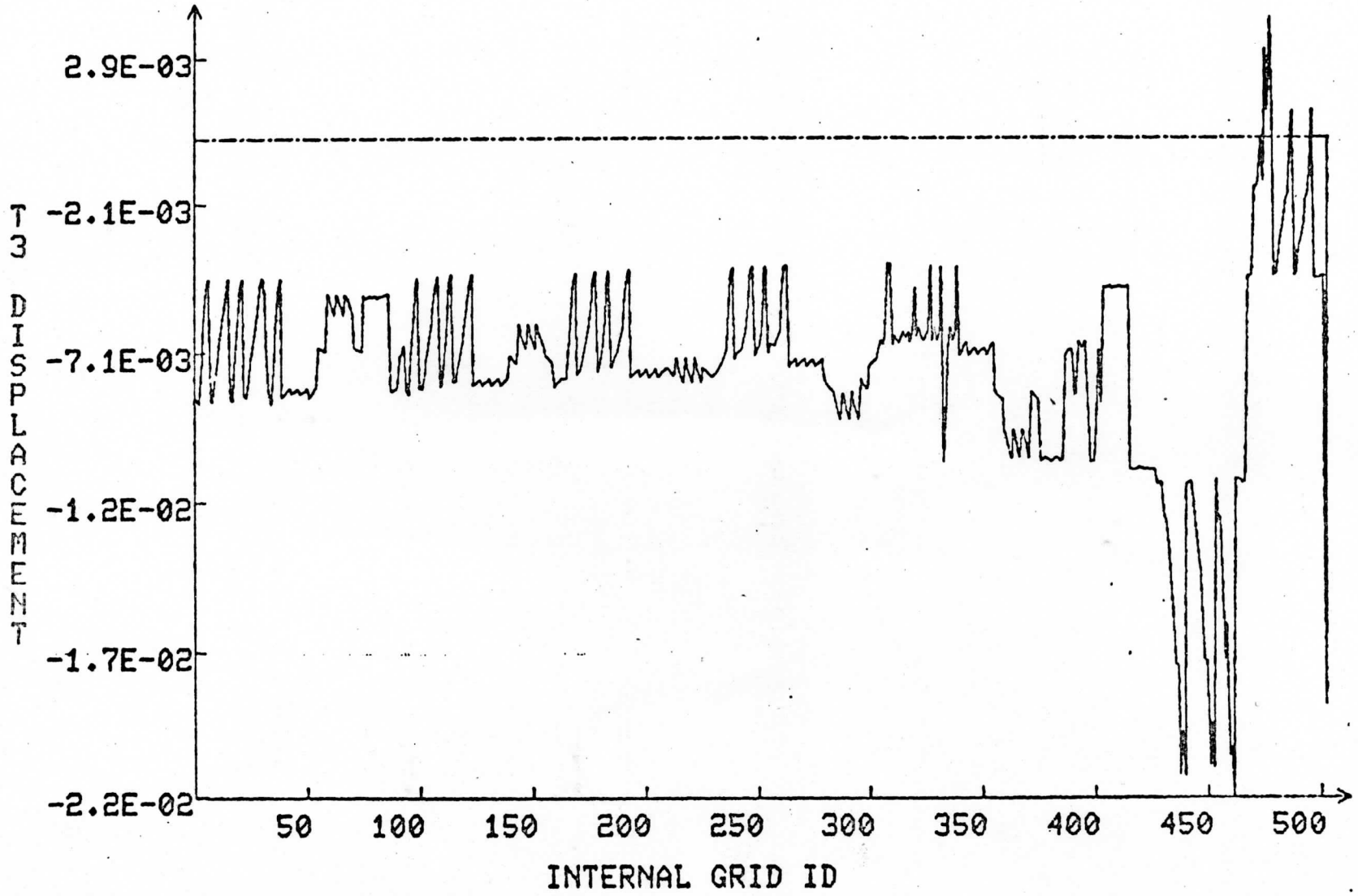
ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 17-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 3



ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 17-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 3



ENTER RANGE TO BE GRAPHED:

APPENDIX D

RUN 4

MODEL CHANGES FROM RUN 3

- Vertical box beam walls in fore and aft bays were increased in thickness from .2" to .4"
- Mounting bracket was widened to same dimension as bottom of box beam*

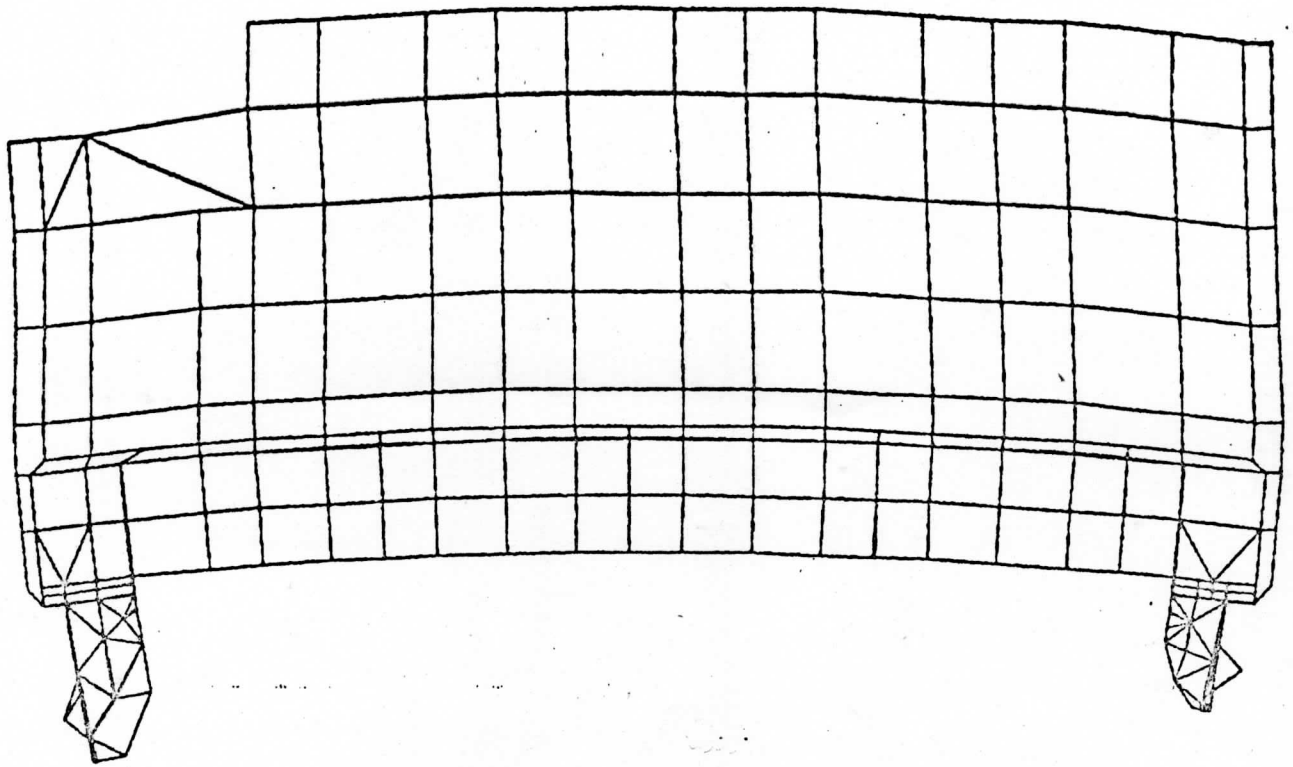
RESULTS

- k = 64,500 lb./inch
- Local deformation is reduced
- The load is still not transferring well to the base plate

* It was later discovered that improper RBE2's were used in this run. (This had little effect)

Run (1)

RX= -90. RY= -90. RZ= 0. GRAFAX 18-APR-79
SUBCASE 1 MAXD -8.019372
ENTER A VIEW COMMAND:



APPENDIX E

RUN 5

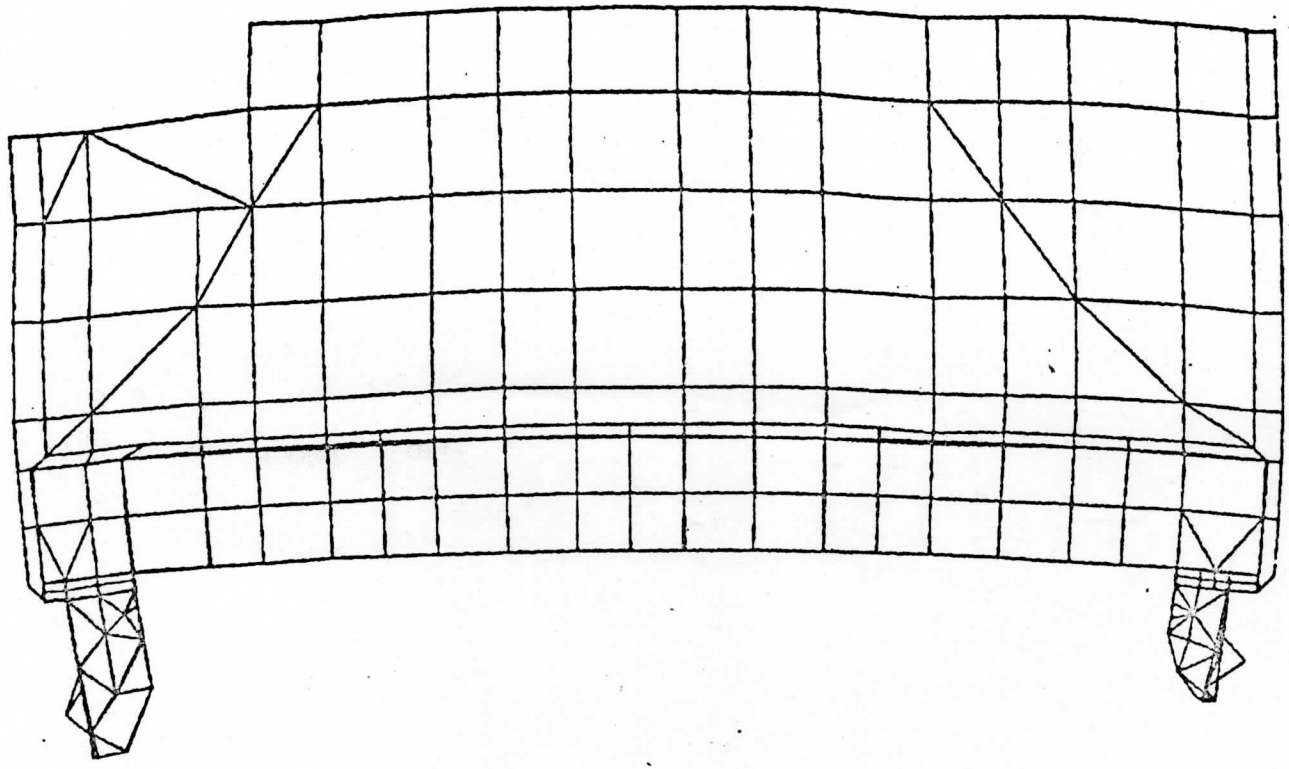
MODEL CHANGES FROM RUN 4

- Diagonal bars were added to the base plate to make it work more as a truss

RESULTS

- k = 75,700 lb./inch
- The base plate bars are now carrying significant axial load indicating the box beam and base plate are now acting more as a unit

RX= -90. RY= -90. RZ= 0. GRAFAX 18-APR-79
SUBCASE 1 MAXD -0.016953
ENTER A VIEW COMMAND:



APPENDIX F

RUN 6

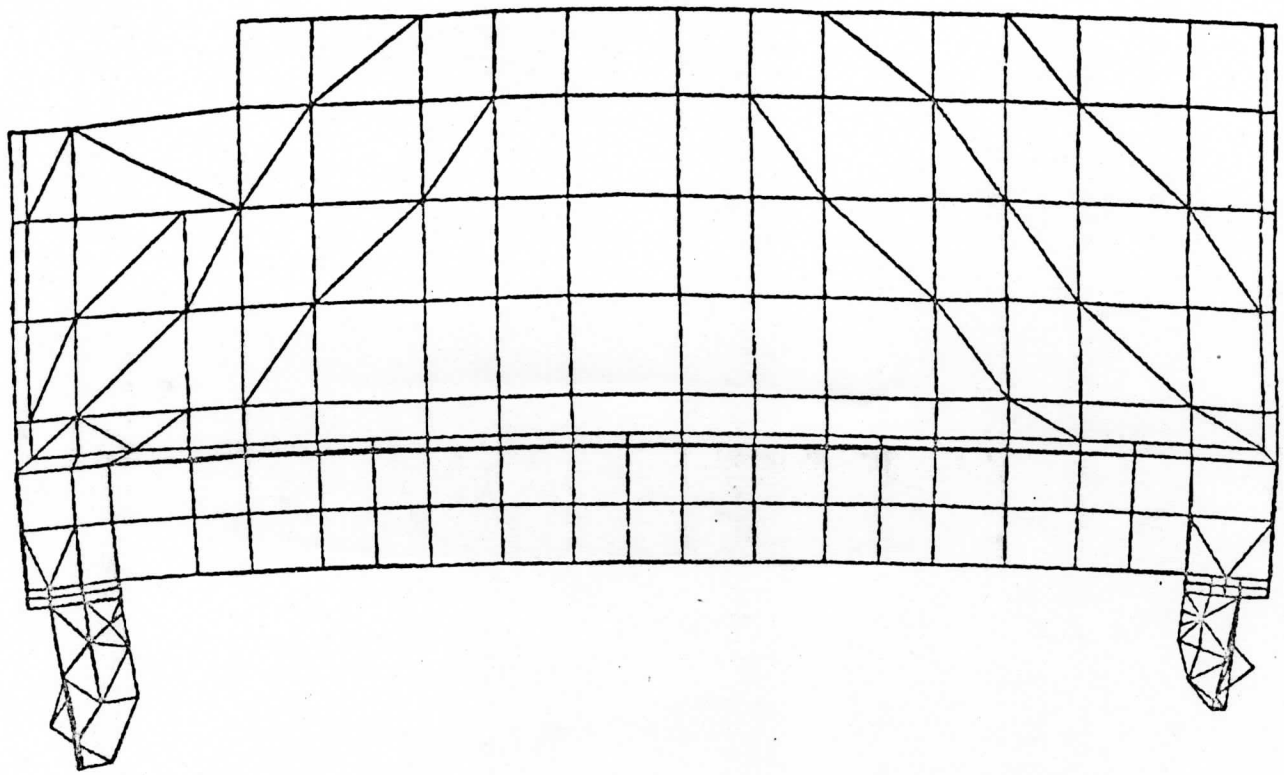
MODEL CHANGES FROM RUN 5

- Existing diagonals were extended to the top
- More diagonals were added to fore and aft bays

RESULTS

- k = 85,000 lb./inch
- Box beam and base plate combination acting more as an ideal beam

RX= -90. RY= -90. RZ= 0. GRAFAX 19-APR-79
SUBCASE 1 MAXD -0.015063
ENTER A VIEW COMMAND:



APPENDIX G

RUN 7

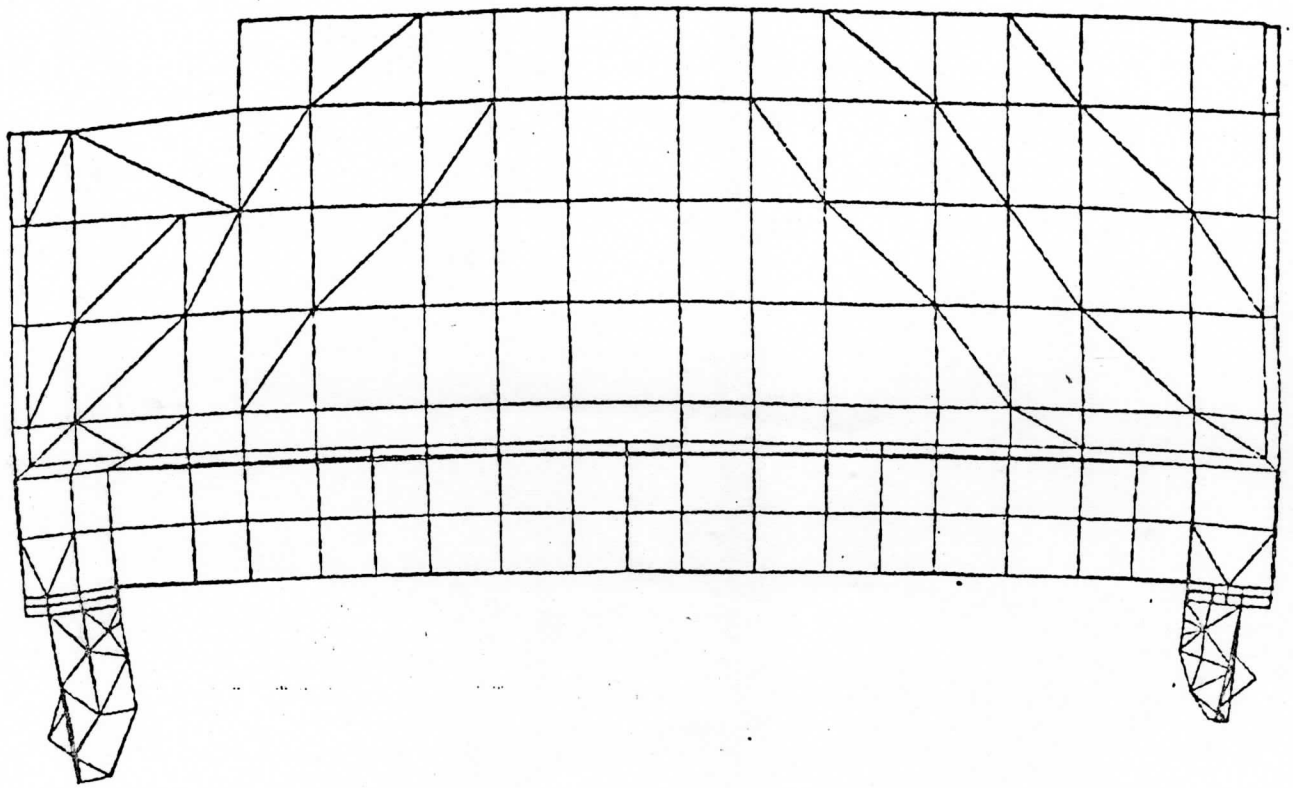
MODEL CHANGES FROM RUN 6

- Fore and aft vertical walls of box beam were reduced back to .2" thickness
- Bad RBE2's used to connect the mounting brackets (that had been used since Run 4) were corrected

RESULTS

- k = 80,000 lb./inch
- More local deformation occurred due to reduced wall thickness

RX= -90. RY= -90. RZ= 0. GRAFAX 20-APR-79
SUBCASE 1 MAXD -0.016083
ENTER A VIEW COMMAND:



APPENDIX H

RUN 8

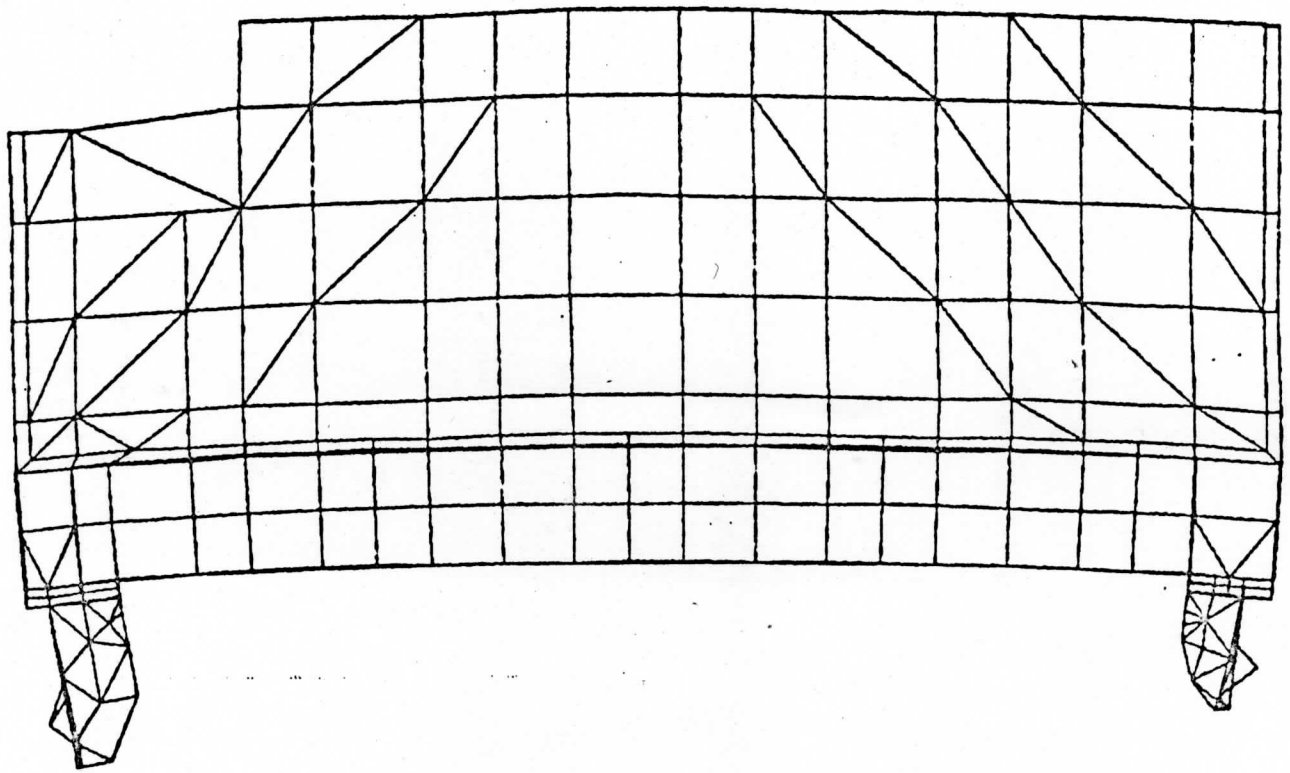
MODEL CHANGES FROM RUN 7

- Vertical wall thickness of box beam increased to .4" in fore and aft bays (This is Run 5 with corrected bracket RBE2's)

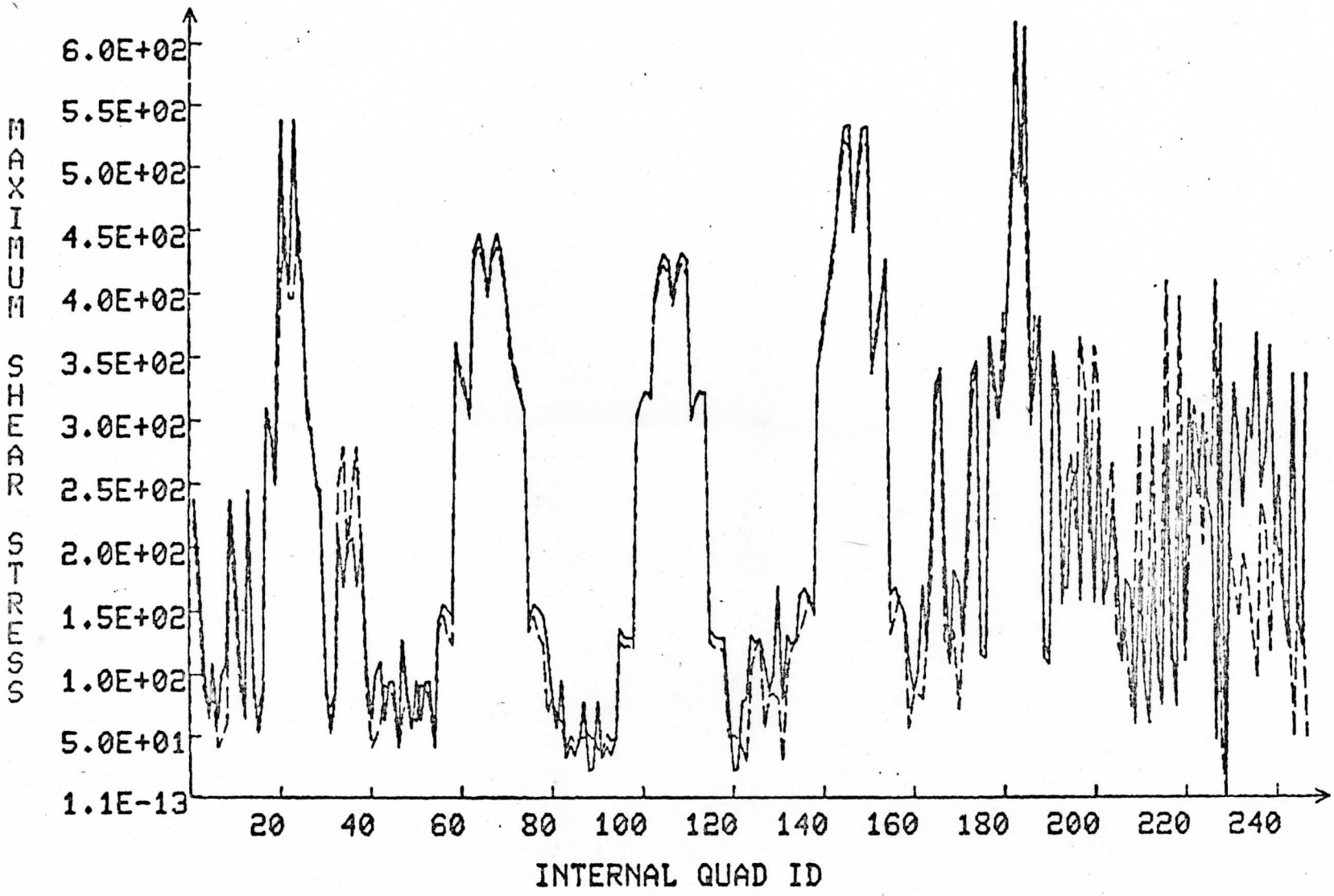
RESULTS

- k = 86,300
- Bad RBE2's had little effect

RX= -90. RY= -90. RZ= 0. GRAFAX 20-APR-79
SUBCASE 1 MAXD -0.014894
ENTER A VIEW COMMAND:

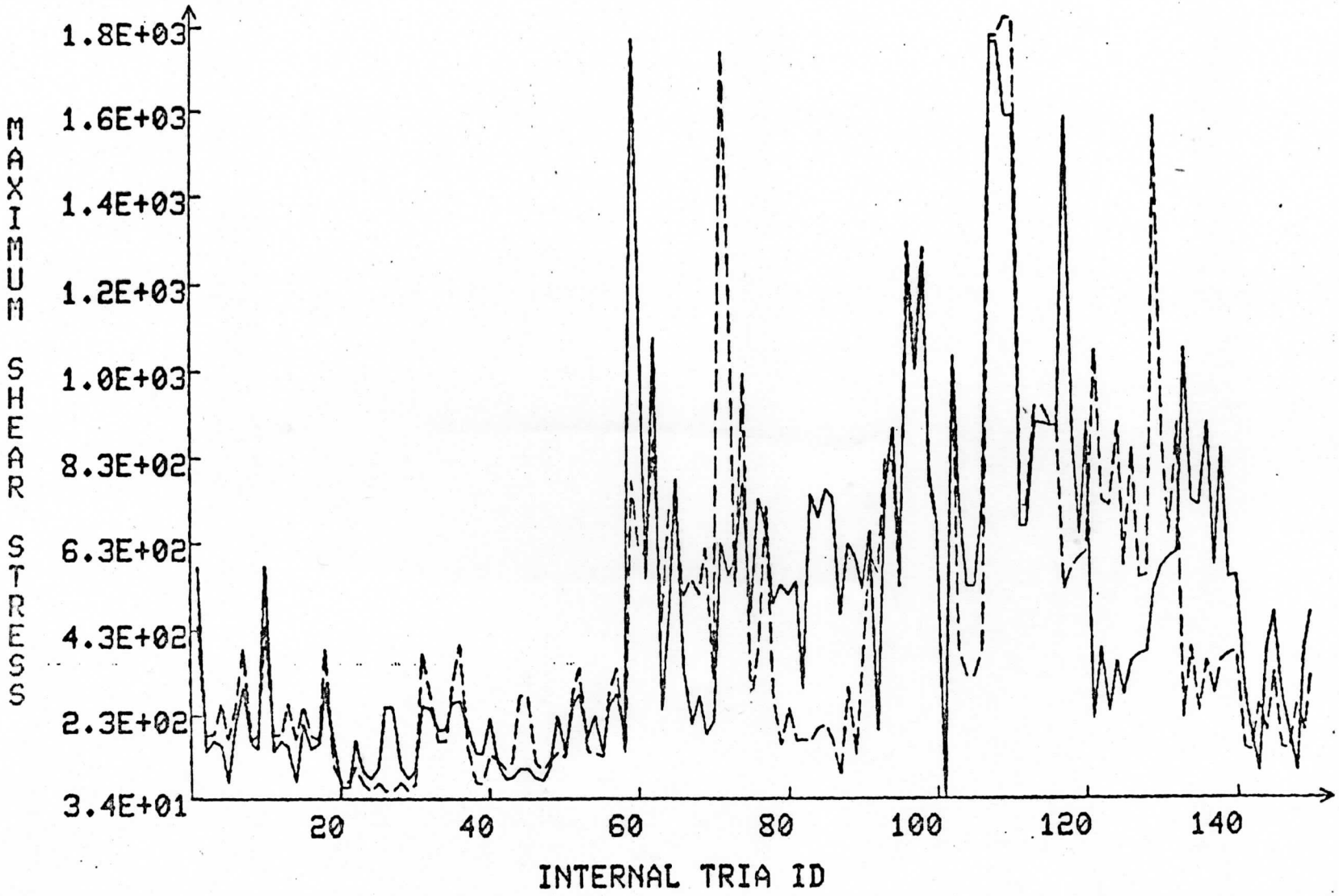


AOS GRAFAX SUBCASE 1 20-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 8



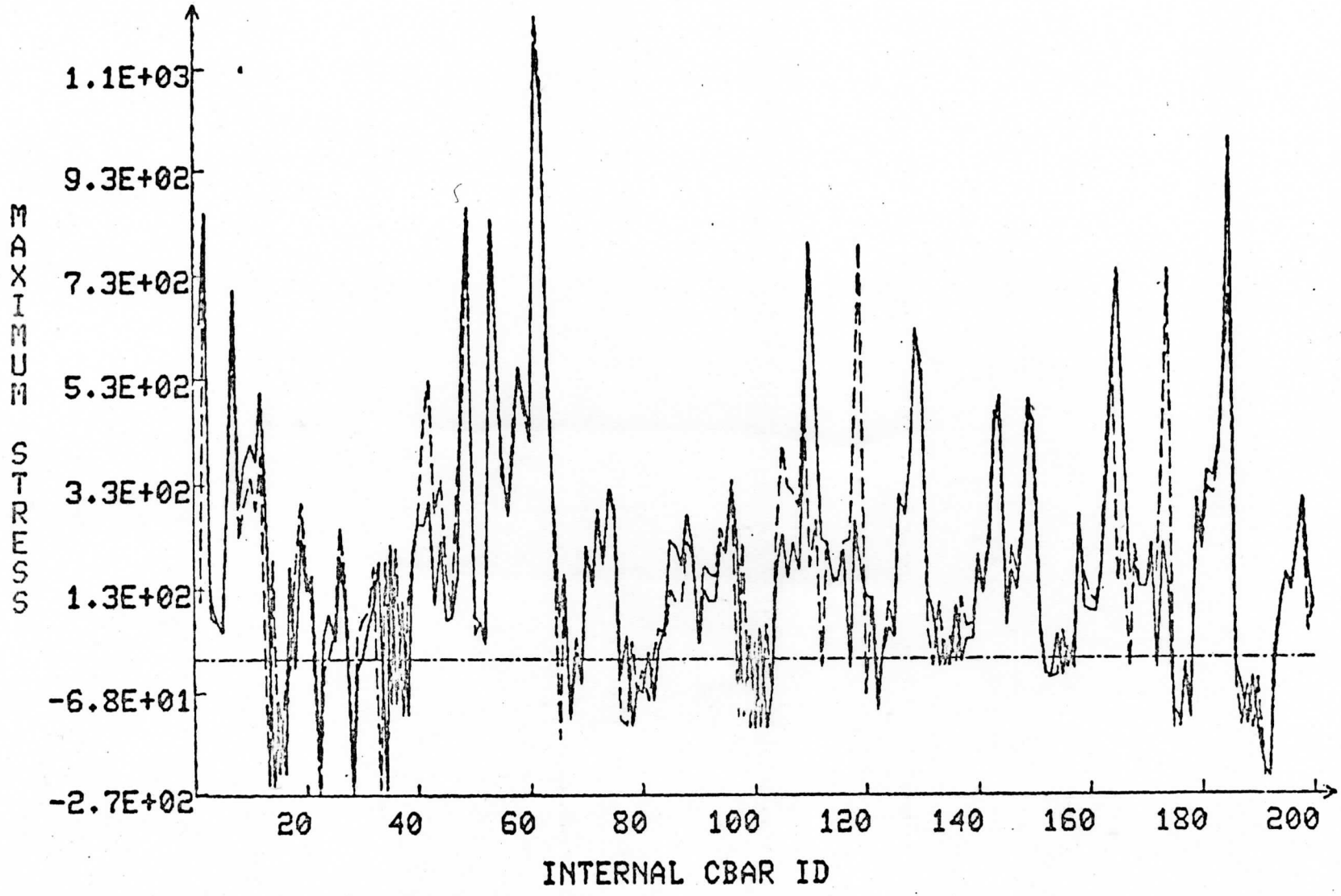
ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 20-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 8



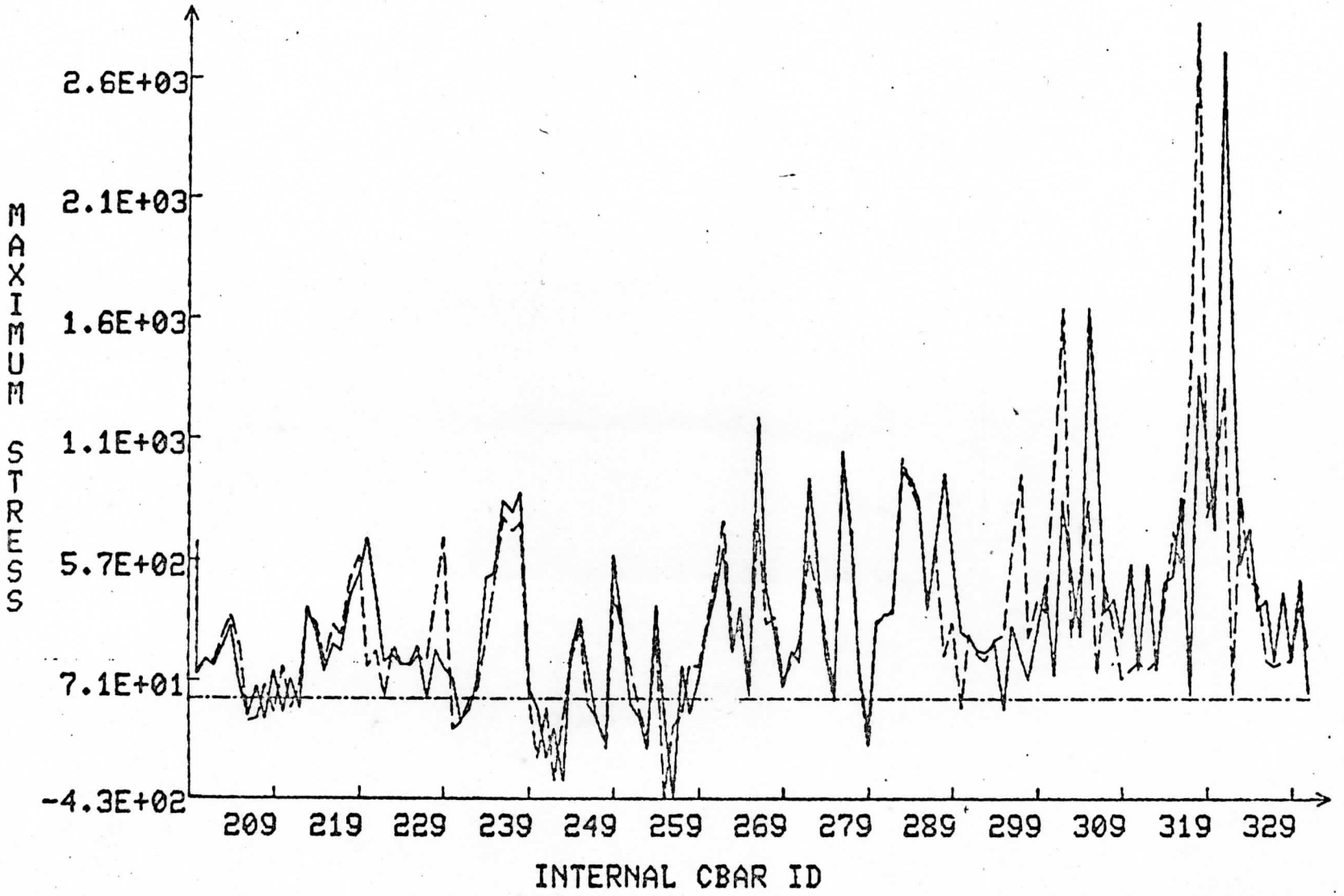
ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 20-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 8



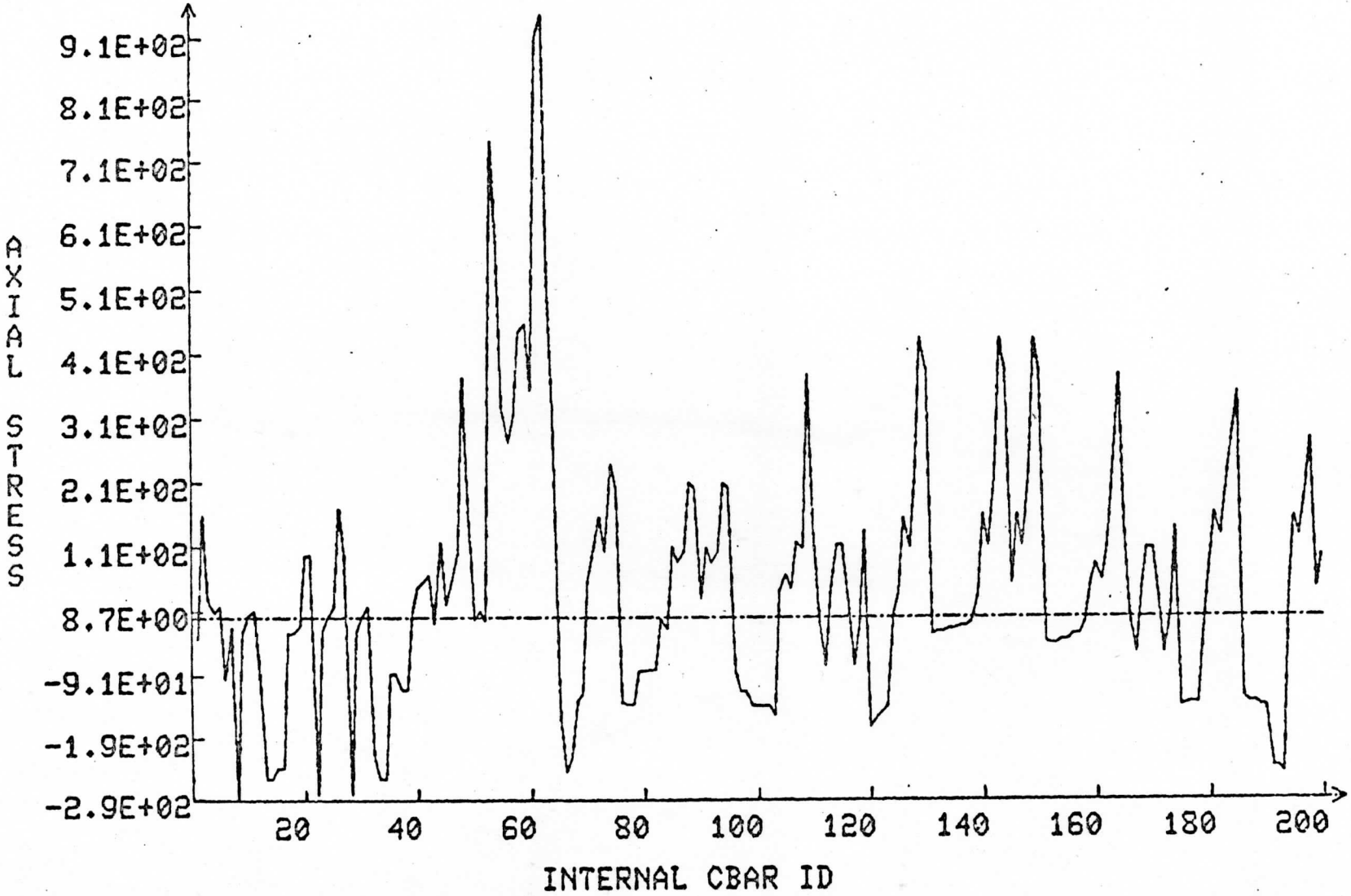
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SPACE TELESCOPE
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RUN 8



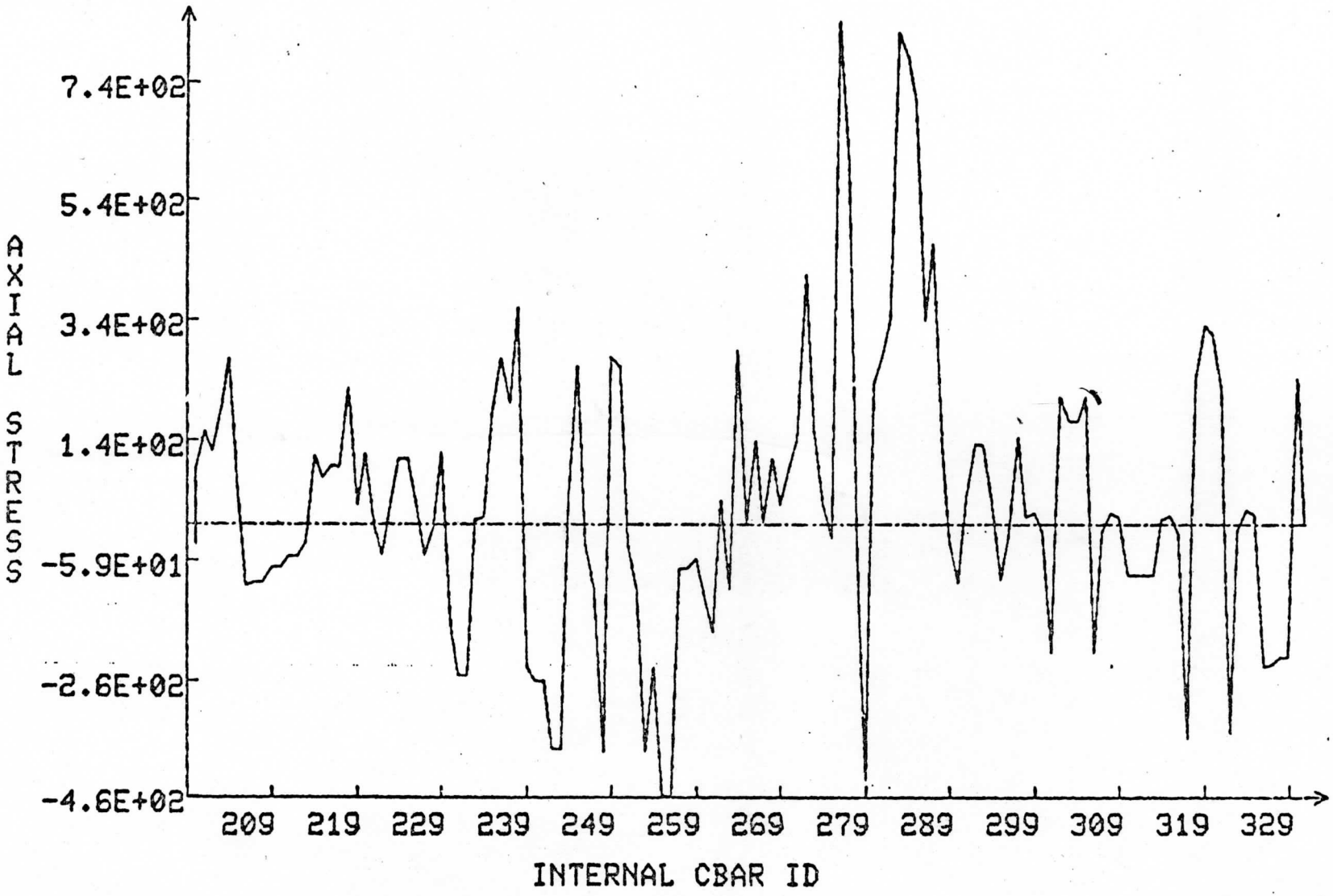
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AOS GRAFAX SUBCASE 1 20-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 8



ENTER RANGE TO BE GRAPHED:

AOS GRAFAX SUBCASE 1 20-APR-79
SPACE TELESCOPE
BOX BEAM AND BASE PLATE
RUN 8



ENTER RANGE TO BE GRAPHED:

Don Johnson

DR-MA-02 Number 14
Issued: 18 June 1979

Monthly Report

for

May 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

A PDR was held at ITT in Fort Wayne on May 22 to review the progress on the Image Dissector Tubes. There are no major problems to date, but several interface issues require resolution. The length of cable to be supplied with each assembly needs definition and the axial adjustment scheme must be defined in order to allow the tube mounting foot design to be completed. The effort at ITT appears to be on schedule.

The PCDS PDR was held at Collins Radio in Cedar Rapids on May 31. Breadboard tests of the preregulator and detector supplies have been performed. Performance is well within specification. The line regulation performance of the detector supplies has led to a redesign of the PCDS which will save weight and power. The original design concept of the PCDS was to have a preregulator in series with the detector supplies to condition the bus voltage to allow the detector supplies to run at higher efficiency. Since the PCDS effort was begun the bus voltage range has been reduced and is within the capability of the detector supplies without a preregulator. The detector supplies will be removed from the preregulator and will operate directly off the input bus. The preregulator will be smaller, will consume less power, and will weigh less. The space made available by the small preregulator will now be used to house the heater control relays which were formerly in the PDU. With the heater control relays in the PCDS, the need for a PDU is eliminated. This eliminates an EMI filter and the separate PDU housing.

Prelayout reviews (PLRs) were conducted at SSEC in May for the current to voltage converter, deflection amplifier, system controller, and detector controller. PWB layout is proceeding on schedule for the analog electronics. The review of the digital electronics resulted in some simplification of the hardware design which will reduce the parts count. Work is progressing on producing a wire wrap version of the digital electronics. Procurement delays may cause the delivery of some of the wire wrap boards to slip. Efforts are being made to accelerate delivery to avoid a slip in the completion date for the completed wire wrap assembly.

A review of the NASTRAN structural modeling effort was held at A.O. Smith in Milwaukee on May 8. Because of the weight reduction directive, the NASTRAN model development plan was changed to provide a more detailed model of the main structural elements earlier. This model was then iterated to reduce weight before the complete instrument structure was added. The review was required to assess the cost and schedule impact of this change in plan. The NASTRAN model is now progressing rapidly and is expected to be completed in June. After the model is complete, a set of load case runs will be made.

The STSOP sent a mechanical layout engineer to SSEC in May for a four week visit. This has accelerated the preliminary layout drawing effort.

The GSE design was also reviewed in May. Several subsystems have been designed and turned over to drafting for generation of schematics, wire wrap layouts, and parts lists.

Instrument software is progressing. A set of test software for the wire wrap version of the digital electronics has been coded, recorded on floppy discs, and is awaiting completion of the hardware.

A team (IDT) meeting was held in Madison on May 17 and 18. A change was made to the system controller to provide for simultaneous operation of two detectors. The HSP filter list was also discussed. The next meeting was tentatively scheduled for Sept.7.

Revised power and weight budgets are attached.

B. Schedule Section

The milestone status as of 6/11 is attached. The milestone numbers have not changed since last report. Delivery of the TSU to GSFC for environmental tests has been shown on our schedules as December 1. Recent discussion with GSFC indicates that January 11, 1980 would be a better target in terms of test facility readiness.

C. Problem Areas

The ICD items discussed in last month's report remain unresolved. There are no new major problems.

D. Science Section

Procurement of the PMT began in May. The HSP optical design has been updated by Dr. Schroeder and a summary is included as an appendix.

E. Documentation Section

Delivery of the simplified structural math model (SE-03) is now expected in July.

F. CCB Activity

The following is a summary of HSP CCB activity in May:

PIRN (SI to OTA/SSM)	HSP Action
2003 R1, 2005	Accepted -- no impact 5/24
2006	Received 5/24 (subsequently approved 6/13 -- no impact)
2007	Received 5/31
PSCN (STR-02)	
20	Received 5/17 (subsequently approved 6/13 -- no impact)
GSFC TD	
"Space Telescope Weight Control Plan"	see attached weight budget

HSP MILESTONE STATUS 6/11/79

MSTONE	NEW XX CHANGE X	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
3a	X	5/14	Order PMT		6/29	Need spec.
6	X	3/7	Optical parts specified	5/28	6/1	Not critical
8		3/12	DCP BB design	4/10		
8a	X	6/4	DCP wirewrap list complete		6/22	PLR changes
9	X	3/29	Optical parts ordered		6/22	Not critical
10		4/2	Coarse NASTRAN results	4/11	4/16	
11		4/4	BB tests complete	4/20	4/20	
12		4/5	Prelim.subsyst.box design	4/16	4/16	
13	X	5/9	RIU,DMA,parallel I/F design		6/14	Need GSFC info
13a	X	5/23	Science interface design	6/8	5/28	
14	X	4/4	Cable layout	5/18	5/7	
15		4/9	PAD PLR	4/12	4/12	
[illegible]	X	5/3	CVC,defl.amp. PLR	5/15	5/15	
16-1	X	4/17	DCP BB		7/17	PLR changes
16-2		4/17	DCP BB test box		6/25	None required
16-3		4/17	DCP test software		6/25	Compl.except do
17	X	4/17	IDT PRR	5/22	5/25	
18	X	5/4	NASTRAN--detailed model		6/25	Model compl
19	X	5/4	DEA box design		6/15	PLR changes
19a	X	5/21	Pwr Distrib.Unit box design		TBR	May be elim.
19b	X	5/7	Signal Distrib.Unit box design		TBR	Needs defn
19c		8/6	System controller box design		8/6	
19d	X	6/10	Preamp. box design		6/22	PLR changes
20-1		6/25	PWB layout compl. for CVC and defl.amp.		6/25	
[illegible]-2		6/25	PWB layout complete for PAD		6/25	
21	X	5/14	Detailed mechanical design		7/25	typo

	X	5/22	Flight parts ordered	TBD	PLR changes
23		5/28	DCP hardware debugged	7/9	
24	X	5/29	Cable harness layout complete	TBD	Need SDU,RIU status bits
25-1		8/2	Fab.RIU,DMA,parallel interface	8/2	
25-2		8/2	Fab.science interface	8/2	
25-3		8/2	Fab.PBS,TCB	8/2	
25-4		8/2	GSE software	8/2	
26		7/2	GSE subsystem tests	8/19	
27-1		7/9	EM parts received	7/9	
27-2		7/9	PWB received	7/9	
27-3		7/9	DEA boxes received	7/9	
27-4		7/9	PDU box received	7/9	
27-5		7/9	SDU box received	7/9	
-6		7/9	Preamp. box received	7/9	
28-1		7/23	GSE hardware complete	8/2	
28-2		7/23	HSP EM software	8/2	
29		8/6	DCP software debugged	8/6	
30		8/6	EM subsystem complete	8/6	
31		8/15	HVPS EM received	10/16	
31a		8/15	IDT EM	11/12	
31b		12/14	IDT/HVPS test complete	12/14	
32		8/15	TSU shipping container design	8/15	
33		8/20	TSU mass simulator	8/20	
34-1		8/29	DCP BB test complete	8/29	
34-2		8/29	Syst.controller wire harness design	8/29	
35		9/4	GSE test complete	9/23	
36-1		9/4	Test EM subsystem	9/4	
36-2		9/4	EM cable harness	9/4	

37-1		9/4	Fab. TSU structure		9/4	
37-2		9/4	Build TSU handling fixture/sling		9/4	
38		9/15	TSU GSE design complete		9/15	
39-1		10/1	EM hardware integrated		10/1	
39-2		10/1	EM software complete (8080)		10/1	
40		10/10	MLB layout complete		10/10	
41-1		10/17	Build TSU subsyst.mass simulator		10/17	
41-2		10/17	TSU structure/wire		10/17	
42		10/28	EM debug complete		10/28	
43-1		11/20	Integrate TSU		11/20	
43-2		11/20	Fab.TSU shipping container		11/20	
43-3		11/20	TSU GSE built		11/20	
44-1		12/3	Fab.of syst.controller box complete		12/3	
44-2		12/3	Fab. MLB		12/3	
45-1		12/17	EM IDT installed		12/17	
45-2		12/17	EM PCDS installed		12/17	
45-3		12/17	Initial test EM complete		12/17	
46		1/10/80	EM syst.controller, detector contl.fab.compl.		1/10/80	
47-1		1/23/80	EMI tests EM		1/23/80	
47-2		1/23/80	EM DCP test complete		1/23/80	
48		3/3/80	EM test		3/3/80	
49		6/15	PBS,TCB design complete		7/2	Mstone 13a
50		7/16	Star Simulator electrical design		7/16	
51		8/27	Star Simulator electr.fab.complete		8/27	
52	X	5/9	DCP PPLR	5/9	5/9	
53		6/20	TSU handling fixture/sling design		6/20	

1979 | 1980

ST/HSP | APRIL 16 23 30 | MAY 7 14 21 28 | JUNE 4 11 18 25 | JULY 2 9 16 23 30 | AUGUST 6 13 20 27 | SEPTEMBER 3 10 17 24 | OCTOBER 1 8 15 22 29 | NOVEMBER 5 12 19 26 | DECEMBER 3 10 17 24 31 | JANUARY 7 14 21 28 | FEBRUARY 4 11 18 25 | MARCH 3 10 17 24

VACATIONS/HOLIDAYS

REVIEWS / MEETINGS

DETECTORS
IDT

PMT

FILTERS / MIRRORS

ANALOG ELECTRONICS

BOX DESIGN

DIGITAL ELECTRONICS

WIRE HARNESS

STRUCTURE /ODS

GSE

HVPS EM 20 → 31 R&I HVPS → 31A TEST IDT → 31B
IDT EM 20 → 17
ORDER PMT 25 → 3A → TO 27
SPECIFY ODS OPTICS 25 → 6 ORDER 9 → TO 36, 41
ORDER FILTERS 22
CVC, DATA AMP 25 → 15A
PWB LAYOUT, CVC, DATA AMP L
EM PARTS 60
PWB LAYOUT PAD 25 → 20 FAB PWB 60 → 27 BUILD EM SUBSET
EM CONNECTORS → 30
TEST EM SUBSET → 36 INTEGRATE EM
EM S/W 34 → 39 DEBUG EM → 42 INITIAL TEST - EM 60/20
EM PCBS 20 → 45
INSTALL IDT 60
EMI TEST EM 20 → 47 FINAL EM TEST 20 → 48 FAB FLT MLB/I
PART. PWR. CON. 20
DEA FAB DES 25 → 19 PDU, 19A SDU, 19B PIC AMP, 19D
FAB EM BOXES 60
SYST CONTROLLER → 19C
FAB SYST CON BOX 60
SCHEMATICS 25 → 52 WW LISTS → 8A FAB BB WW → 16 HDW DEBUG → 23 INT/DEBUG S/W → 29 FINAL BB TEST → TO 36
DCP TEST BOX 25
DCP TEST S/W 39
39 MLB LAYOUT → 40 FAB MLB 60 → 44 BUILD EM DCP 60 → 46
EM DCP TEST
SYST CONTROL W.H. DESIGN
CABLE LAYOUT 25 → 14 CABLE HARN DESIGN → 24 EM CABLE HARNESS 60 → TO 36
NASTRAN MODEL 25 → 18 SIMPLIFIED NASTRAN
DETAILED DESIGN → 21 DESIGN TSU MASS SIM 40 → 33 TSU MASS SIM FAB
RID TSU'S
FAB STRUCTURE 40 → 37 TSU STRUCTURE/WH ASSEMBLY → 41 INTEGRATE TSU → 43 TEST TSU → SHIP TSU → TEST AT GSFC → TO 48
TSU CONNECTORS
TSU REG FITTINGS
DESIGN TSU HANDLING FIXTURE / SLING 120 → 53 BUILD TSU HANDLING FIXTURE / SLING 40
DESIGN SHIPPING CONTAINER 40 → 32 FAB TSU SHIPPING CONTAINER 40
DESIGN TSU GSE 40 → 38 TSU GSE
TSU GSE CONNECTORS
RIU, DMA, II I/F DES 120 → 13 DES SCI I/F → 13A DESIGN PBS, TCB → 49 *SIM → 50 *SIM FAB/TEST → 51 INT W/ GSE → 35 → TO 39
25 SUBSYST TEST → 26 INT → 28 DEBUG
GSE S/W 35
EM GSE CONNECTORS
EM S/W 35

53

EFF 4-27-79
5-4-79 REV
6-11-79 REV

High Speed Photometer Weight Budget (6/11/79)

Reference: 1) HSP 4/2/79 Weight Budget
2) "Space Telescope Weight Control Plan"

		Last Rept. Weight	Present Weight	Change	Design Maturity Code	% Req. Contingency	Req. Contingency Weight	Notes
1.	Main Spar	40	45	+5	CL	13	5.85	1
2.	Main Spar Stiffeners (6)	12	12	0	CL	13	1.56	
3.	Electronics Base Plate (EBP)	28	40	+12	CL	13	5.20	1
4.	Main Spar/EBP Interface	12	7	-5	CL	13	0.91	1,2
5.	Forward Bulkhead	20	20	0	CL	13	2.60	
6.	Aft Bulkhead	20	20	0	CL	13	2.60	
7.	Interior Bulkheads (4 sets of 2)	35	35	0	CL	13	4.55	
8.	Free Corner Bulkhead Ties	10	9	-1	CL	13	1.17	3
9.	Outside Skin	59	62	+3	PR	3	1.86	3,4
10.	Electrical Connector Plate	3	3	0	CL	13	0.39	
11.	Forward Registration Fitting	11	9	-2	CL	13	1.17	3
12.	Aft Registration Fitting	15	12	-3	CL	13	1.56	3
13.	GSE Brackets	20	20	0	CL	13	2.60	
14.	Conductor Panels and Angles (2)		31		CL	13	4.03	
15.	Logitudinal Fiberglass Angles (6)		4		CL	13	0.52	
16.	Longitudinal Aluminum Angles (3)	40	2.5	+5	CL	13	0.33	1,5
17	Conductor Panel Bulkheads (12)		5		CL	13	0.65	
18.	ODS Closeout Bulkheads (3)		2.5		CL	13	0.33	
19.	Cable Harness	20	20		CL	18	3.60	

		Last Rept. Weight	Present Weight	Change	Design Maturity Code	% Req. Contingency	Required Contingency Wgt	Notes
20.	Fasteners	5	5	0	E	18	0.90	
21.	Brackets	5	5	0	E	18	0.90	
22.	PMT Electronics	8	8	0	PR	8	0.64	
23.	IDT Electronics (4)	32	32	0	PR	8	2.56	
24.	System Controller	15	15	0	CL	8	1.20	
25.	PCDS	15	17	+2	CL	8	1.36	1
26.	SDU	8	8	0	E	18	1.44	
27.	PDU	8	0	-8				1
28.	RIU (2)	13	13	0	PR	8	1.04	
29.	Heaters	15	15	0	E	18	2.70	
30.	ODS	60	60	0	CL	13	7.80	
		529	537	+8			62.02	

Summary

Launch Weight	600	Present Weight	537
Required Contingency	62.02	Present Contingency	63

NOTES:

1) Redesign

2) Referred to as "Bolt Plate" in 4/2/79 Weight Budget

3) Refined calculation

4) Item 9. Corresponds to the following items in the 4/2/79 Weight Budget:
   - Access Panels 21
   - Aft Panels 4
   - ODS Closeout @ X00 7
   - ODS Closeout @ Y00 7
   - ODS Closeout 20
   59

5) Items 14 through 18. Correspond to the following items in the 4/2/79 Weight Budget:
   - Radiation Shield @ X00 10
   - Radiation Shield @ Y00 10
   - ODS Closeout Bulkhead 20
   40

SYSTEM POWER INPUTS AND DISSIPATIONS

Optical Detector Subsystem (ODS)

	MINIMUM			NOMINAL			MAXIMUM		
	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Component Dissip.	Prereg. Power	Sec.DC Power	Componen Dissip.
HVPS (η = 0.85)	(1893)	-	(1811)	(1982)	-	(1822)	(2100)	-	(1838)
HVPS - 5 units	9465	-	9053	9911	-	9111	10500	-	9188
IDT Assembly									
Divider	-	-	(83)	-	-	(160)	-	-	(263)
Focus Coil	-	-	(937)	-	-	(1177)	-	-	(1665)
Horiz.Deflection Coil	-	-	(0)	-	-	(17)	-	-	(69)
Vert.Deflection Coil	-	-	(0)	-	-	(20)	-	-	(81)
Preamp	-	(203)	(203)	-	(203)	(203)	-	(203)	(203)
IDT Assembly Total	-	(203)	(1222)	-	(203)	(1578)	-	(203)	(2281)
IDT Assemblies (4 units)	-	812	4889	-	812	6312	-	812	9123
PMT Assembly									
Divider	-	-	(83)	-	-	(160)	-	-	(263)
Preamp	-	(203)	(203)	-	(203)	(203)	-	(203)	(203)
PMT Assembly Total	-	203	(286)	-	203	363	-	203	466
ODS TOTAL	9465	1015	14226	9911	1015	15785	10500	1015	18776

	MIN			NOM			MAX	
Detector Electronics Assemblies								
Pulse Amp.Discr.(PAD)	-	(855)	(855)	-	(855)	(855)	-	(855)	(855)
C-V Amp.	-	(55)	(55)	-	(55)	(55)	-	(55)	(55)
Focus Amp.	-	(2130)	(1193)	-	(2385)	(1208)	-	(2805)	(1140)
Horiz.Deflection Amp.	-	(42)	(42)	-	(222)	(205)	-	(410)	(340)
Vert. Deflection Amp.	-	(42)	(42)	-	(237)	(217)	-	(440)	(358)
Detector Controller	-	(6769)	(6769)	-	(6769)	(6769)	-	(6769)	(6769)
Detector Electronics (IDT) Total	-	(9892)	(8956)	-	(10522)	(9308)	-	(11332)	(9517)
Detector Electronics (IDT)-4 units	-	39570	35823	-	42090	37230	-	45330	38069
Pulse Amp. Discr.(PAD)	-	(855)	(855)	-	(855)	(855)	-	(855)	(855)
C-V Amp.	-	(55)	(55)	-	(55)	(55)	-	(55)	(55)
Detector Controller	-	(6769)	(6769)	-	(6769)	(6769)	-	(6769)	(6769)
Detector Electronics (PMT) Total	-	(7678)	(7678)	-	(7678)	(7678)	-	(7678)	(7678)
Detector Electronics Assemblies Total	-	47248	43502	-	49768	44908	-	53008	45747
System Controller	-	21721	21721	-	21721	21721	-	21721	21721
Power Converter and Distribution Subsystem	S/C Bus Pwr			S/C Bus Pwr			S/C Bus Pwr	
Status Logic	-	32	32	-	32	32	-	32	32
Detector Supply (IDT)	(13461)	-	(3365)	(14301)	-	(3575)	(15381)	-	(3845)
Detector Supply (IDT)-4 units	53842	-	13461	57202	-	14301	61522	-	15381
Detector Supply (PMT)	10509	-	2627	10509	-	2627	10509	-	2627
Digital Supply	29004	-	7251	29004	-	7251	29004	-	7251
Preregulator	12620	-	3155	13214	-	3304	14000	-	3500
PCDS Total	105975	32	26526	109929	32	27514	115035	32	28791

Dissipation Power Balance	Minimum	Nominal	Maximum
HSP (less RIU) power input	105975	109929	115035
ODS	14226	15785	18776
Detector electronics	43502	44909	45747
System controller	21721	21721	21721
PCDS	26526	27514	28791
Subassembly Totals	105975	109929	115035

Nominal Power for Various Operating Modes (not including RIU/EU)

Common electronics	29004
PMT Detector	13151
IDT Detector (each)	16943

CHANGES FROM PREVIOUS BUDGET
(for nominal values only)

	Input Power			Bus Power
Item	Was	Is	Increase	Increase
HVPSs	10020	9911	(109)	1426
Preamps	700	1015	315	324
PADs	5400	4272	(1128)	(2245)
C-V/Ampl.	7725	276	(7449)	(10992)
Defl.Amps	5940	1836	(4104)	(6287)
Focus Amps	12480	9540	(2940)	(5633)
Det.Controller	21500	33843	12343	13506
System Controller	22400	21721	(679)	(3980)
PCDS	32	32	0	(4)
			TOTAL	(13885)
		Bus Power Increase*		(13884)
		Previous Bus Power		123813
		Present Bus Power		109929

* Difference due to roundoff error

CONTINGENCY

Allowable SI Power
Less RM/EU Power
Allowable HSP Power

Present HSP Power

Contingency (140000/109929-1)x100 = 27.35%
(NOTE: this contingency is based on all five detectors operating)

Notes:

1. All power given in milliwatts.

2. Minimum, nominal, and maximum values are based on operating conditions of nominal units only. Does not include unit-to-unit variations.

3. Operating conditions, with all detectors simultaneously powered, will be such that the total power consumption will rarely exceed the totals for nominal in the above budget.

4. Values given in parentheses are non-add subtotals.

Summary HSP Optical Tolerance Checks

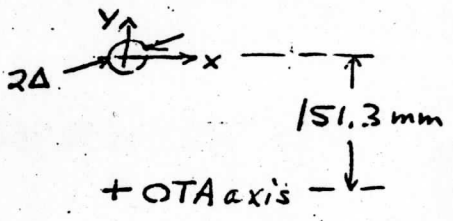
1) Decenter of mirror

Any motion of the HSP mirror along a line perpendicular to the OTA axis is accompanied by a transverse shift of the focal surface at the IDT. For a decenter of Δ, the focal surface shift $\Delta' = (1-m)\Delta$, where m = -0.65. Therefore $\Delta'(\text{mm}) \simeq 1.65\ (\text{mm})$.

As seen from graph 67a the S-surface is translated along z by $\pm 50\mu$, while the T-surface assumes a slightly different orientation. The image blur on a fixed detector is not changed significantly at $\bar{\theta} = 0.9282$, and is about 10μ larger at $\bar{\theta} = 0.8564$ for decenter away from OTA axis and at $\bar{\theta} = 1.00$ for decenter toward OTA axis.

As far as aberrations are concerned, a tolerance $\Delta = \pm 0.5$ mm is acceptable. If we put a tolerance of focal surface location $\Delta' = \pm 0.5$ mm, then $\Delta = \pm 0.3$ mm.

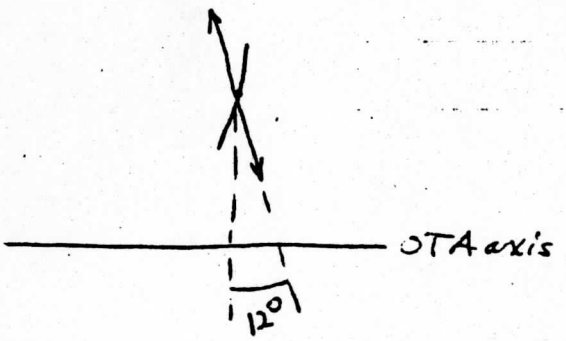
In the computer runs the mirror was decentered along a line at an angle of about 12° as shown below. Hence a 0.5mm decenter consisted of 0.49mm perpendicular to the OTA axis and 0.10mm parallel to the OTA axis.



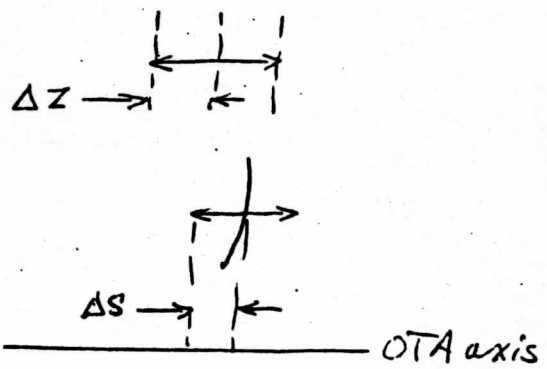
Arrows on 67a show correction needed to take out translation parallel to the OTA axis. With this correction included image blur is essentially unchanged.

2) Despace of mirror

Motion of the mirror along an axis parallel to the OTA axis shifts focal surface in same direction. If mirror is moved toward OTA by an amount ΔS, then focal surface shifts by ΔZ toward OTA, where $\Delta Z = (1+m^2)\Delta S$. Therefore $\Delta Z(\text{mm}) \simeq 1.42 \Delta S(\text{mm})$

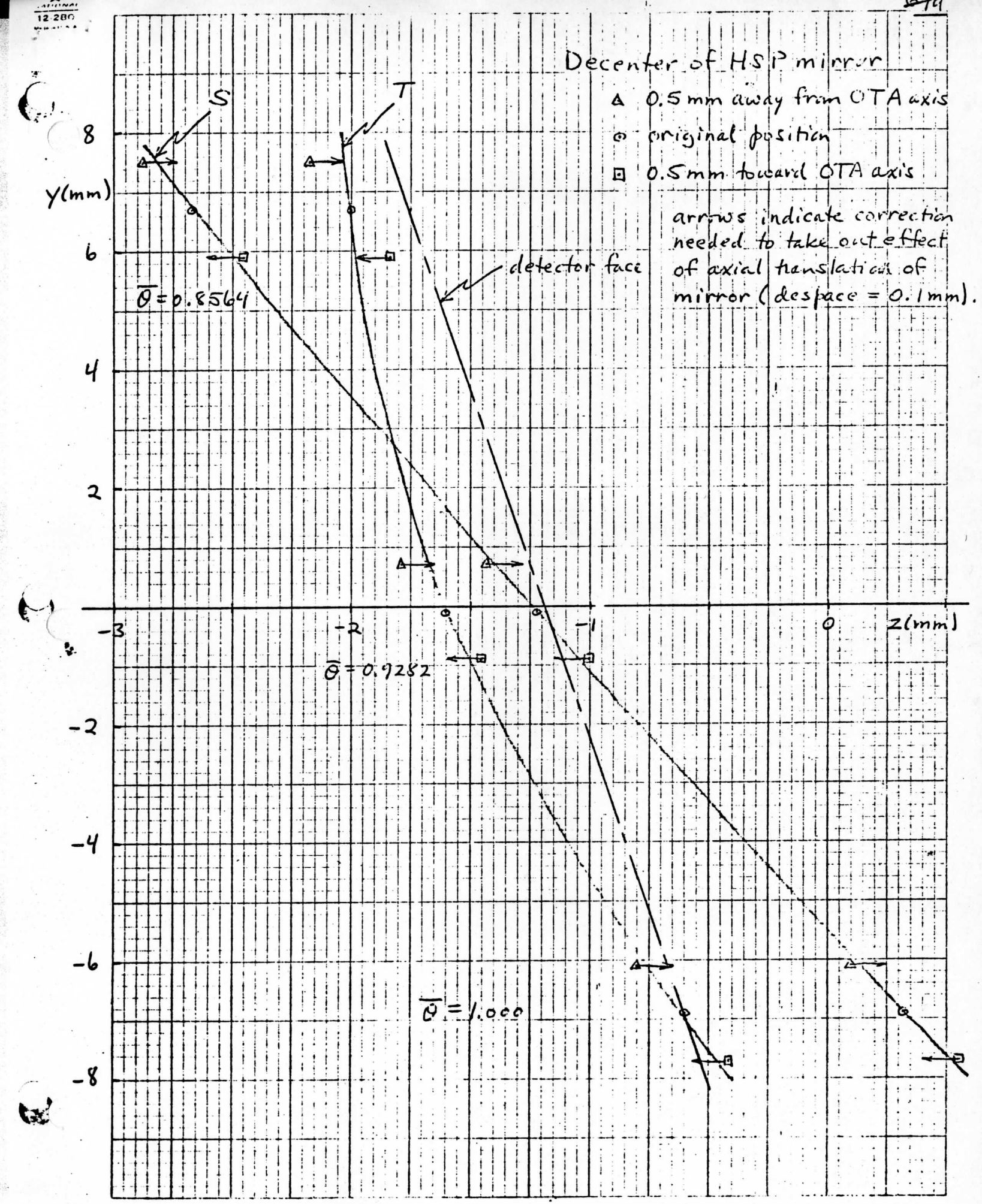


Astigmatism and coma are essentially unchanged by despace, but defocus blur is significant. Graph following 49 suggests that a reasonable tolerance Z is $\Delta Z = \pm 0.2$mm, therefore $\Delta S = \pm 0.14$mm.

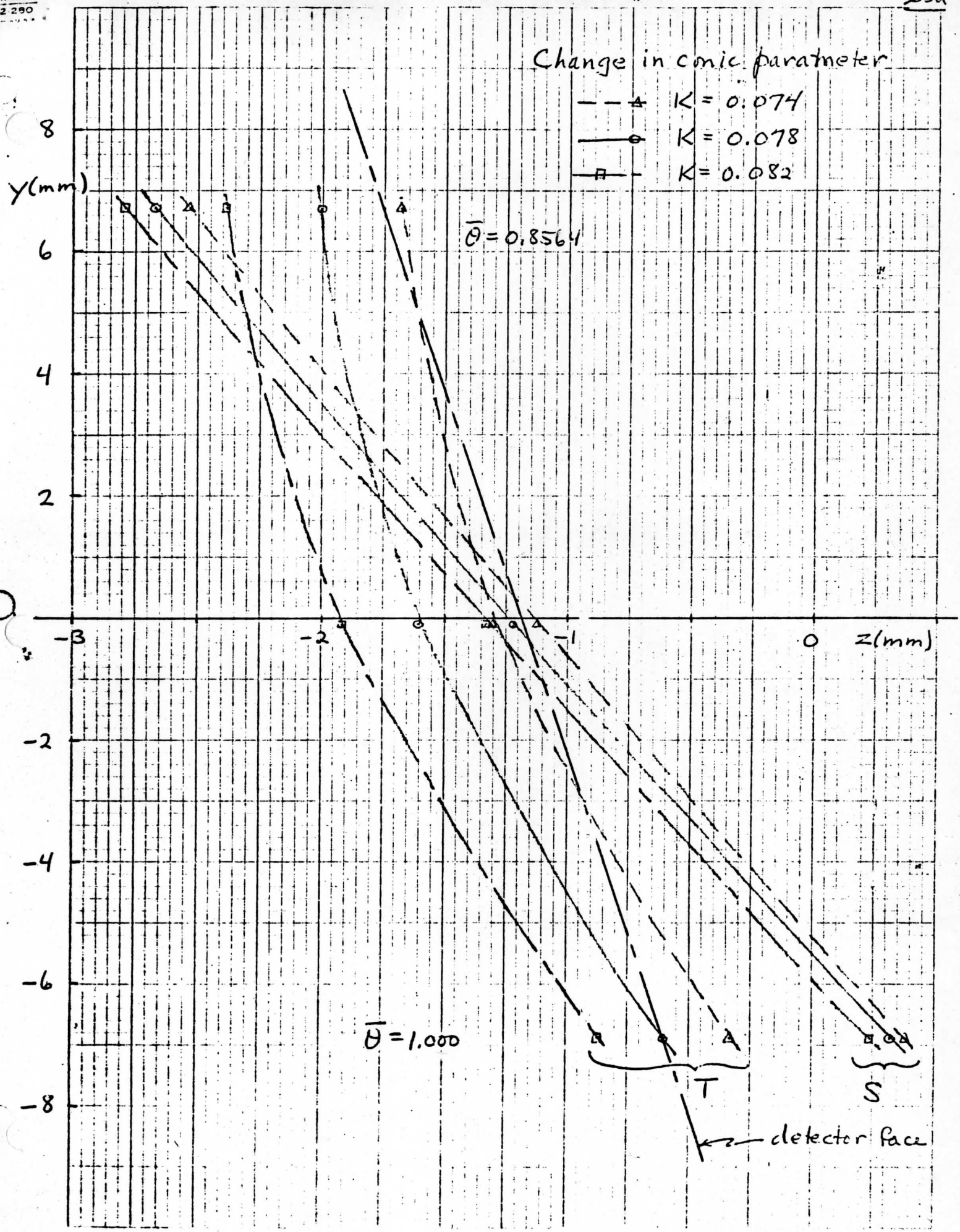


3) Change in K

With $\Delta K = \pm 0.004$ astigmatism is the only item which changes significantly. Lateral position of the focal surface and coma are essentially unchanged. The graph 68a shows the astigmatic focal surfaces for three values of K.



12.280
10 Squares to the Inch


Change in conic parameter
K = 0.074
K = 0.078
K = 0.082
y(mm)
8
6
4
2
-2
-4
-6
-8
-3
-2
-1
0
z(mm)
θ̄ = 0.8564
θ̄ = 1.000
T
S
detector face

For K = -0.074 the T- and S-surfaces cross near y = +1; for K = -0.082 the crossing is near y = +4. Orientation (or tilt) of the focal surfaces is also seen to be slightly dependent on K. If we assume that the detector face is held constant in position and angle, then the approximate maximum blur dimension can be determined from 68a. The results are tabulated below.

Maximum blur dimensions (in μ) as f(K)

K	$\bar{\theta}$=0.8564	0.9282	1.000
-0.074	51	10	63
-0.078	59	27	59
-0.082	68	47	54

The numbers suggest a reasonable tolerance is $K = -0.078\ ^{+0.004}_{-0.002}$.

From the surface equation we find $dz/dK \simeq y^4/8R^3$. At the center of the off-axis mirror y ≃ 154mm (measured from ellipse axis). With R=-640mm we get dz ≃-0.27dK, where dz is in mm. With dK=0.004 we get dz 1.1μ at the center, or about two waves green light. The tolerance on K is not a very strong one on optical figuring.

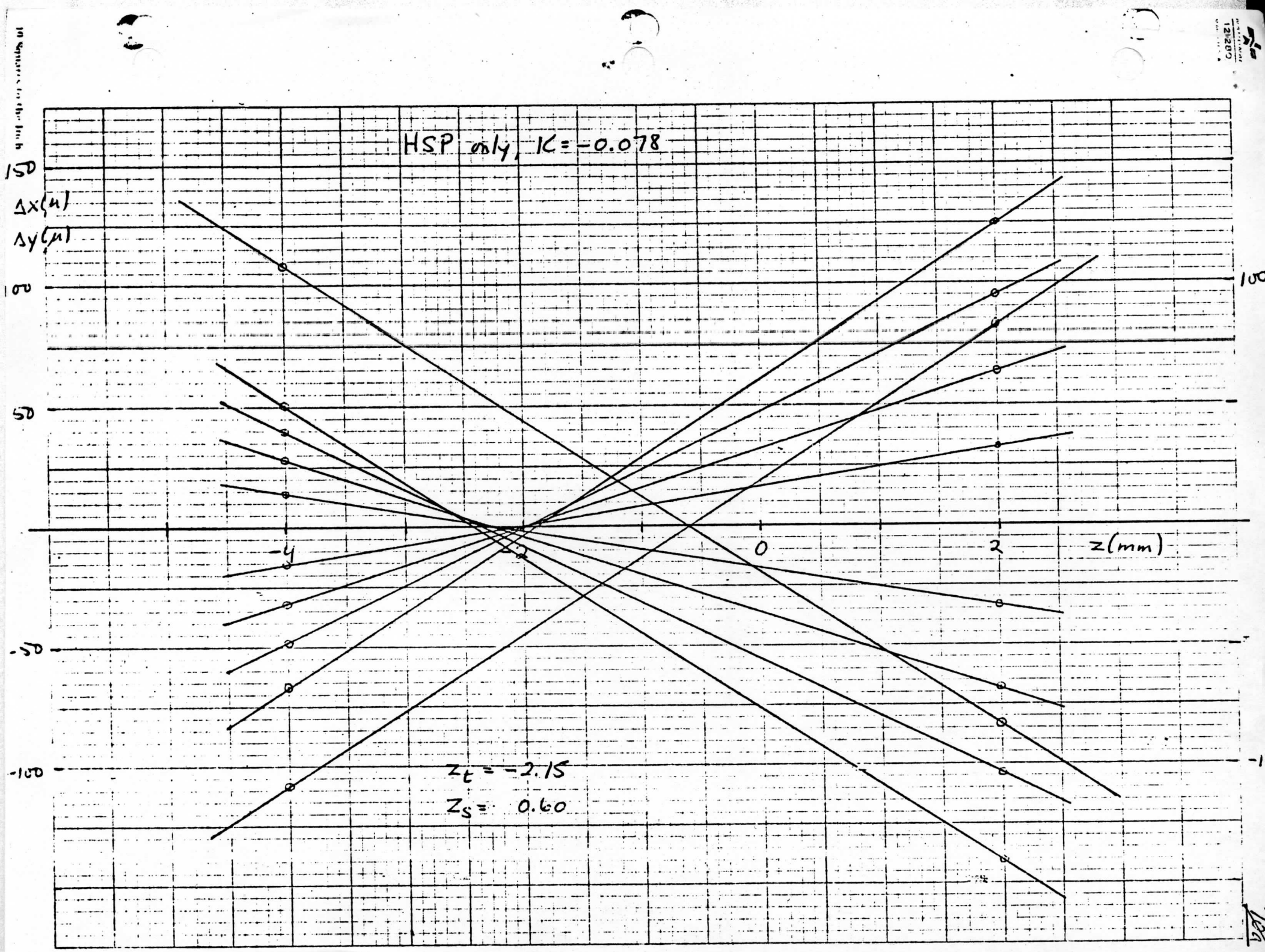
4) Change in mirror radius of curvature

Let R differ from its nominal value of -640mm by amount ΔR. Assume that distance S from entrance hole to mirror is changed by some amount to compensate. Therefore ΔS=ΔR. Under these conditions ΔZ ≃ R/18 or 55μ/mm change in R. Coma and astigmatism are essentially unchanged for ΔR=±1mm, and an additional small despace will essentially reproduce the original system except for a small change in scale. This change in scale is about 12μ over a 13.4mm span (or about 0.1%) for ΔR=1mm. The contraint on R need not be a tight one, and R=-640±2mm is chosen.

HSP system without ST

For K=-0.078, the HSP has been traced assuming a point source at the center hole of the aperture plate. The FAN plots are shown on 70a. Results are as follows:

	HSP (with)	HSP (without)	
y(mm)	-0.122	-0.183	
Z_s(mm)	-1.22	-0.60	
Z_t(mm)	-1.60	-2.15	
$\bar{Z}$	0.38	1.55	
TC(μ)	-10.0	-8.0	
S-blur (μ)	10.0	38.0	} at Z=-1.18mm
T-blur (μ)	30.0	62.0	} at Z=-1.18mm


HSP only, IC = -0.078
150
Δx(μ)
Δy(μ)
100
50
-50
-100
-4
-2
0
2
z(mm)
$z_t = -2.15$
$z_s = 0.60$

Don Johnson

DR-MA-02 Number 15
Issued: 11 July 1979

Monthly Report

for

June 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The High Voltage Power Supply (HVPS) PDR was held at Velonex on June 5. There are no major design problems in part because the design is similar to a standard product which has been in production for some time. The D/A converter is not determined because of some question about the availability of the first choice of a D/A chip. The most serious problem is the delivery time quoted for the Cannon connector. A hermetically sealed connector is required for the input power and control lines because of the potting technique used by Velonex. Alternative hermetic connectors have been investigated, but all have long quoted deliveries. If at least one set of connectors cannot be located early it will impact the delivery of the engineering model HVPS.

Details of the PCDS changes have been worked out and are now being incorporated into the specification. The heater control requirements formerly housed in the PDU have been defined and are now in the PCDS. There will be six heater control circuits, each with its own independent relay on and off commands. The six controls are for the following heaters:

1. Registration fitting A
2. Registration fitting B
3. Registration fitting C
4. Panel X00 (facing adjacent axial SI)
5. Panel Y00 (facing adjacent axial SI)
6. Aft panel

The heaters are not redundant. Panel X00 and Y00 heaters consist of four elements in parallel. The aft heater is two elements in parallel. Each heater control circuit is individually fused and has a bilevel telemetry bit to indicate relay position.

The interface questions from the IDT PDR in May have been resolved and ITT is proceeding with detailed design of the housing and brackets. The IDT work appears to be on schedule.

It was determined in June that the PMT is no longer made by EMR. This fact did not surface until interface definition was well under way. A Varian tube with similar characteristics, including size,has been selected. There was a slight impact on the HSP layout and the interface definition effort was set back to the beginning. The cost of the Varian tube is lower than the quoted price of the EMR tube.

Layout of the analog electronics PWBs is now well along and tape-ups are expected to be complete in late July. There have been a few minor changes mostly involving resistor values in the past month. Except for a few one percent resistors the engineering model analog electronics parts have been received.

The digital electronics wire wrap lists were completed, wire wrap boards received, and wire wrapping begun in June. The boards for the first redundant half of the system controller and one complete detector controller are expected to be completed by the third week in July. The second redundant half of the system controller will not be wrapped until the first half has been debugged and tested. Test software is ready for digital debug and test. Parts are in hand with few minor exceptions. Line drivers and receivers have not been received, but are not required for early phases of testing.

The selection of parts used for the ROM was changed in June because of performance and cost. A fusable link PROM will be used for the flight unit and late engineering model tests. Early EM tests will be done with E PROMs to facilitate software changes.

The NASTRAN model was completed in June and case runs were begun late in the month. The dynamic runs and the reduced model are expected to be complete in early July. No design problems have been found to date. A.O. Smith is preparing a quotation and draft statement of work for inclusion of the HSP thermal model in the NASTRAN model. We now expect that will be started in July.

Mechanical layout effort continued in June. Harry Toy returned and will be here at least through September to assist in layout, preparation of part detail drawings, and design of assembly fixtures. The electronics baseplate and bulkheads for the TSU and the DEA and preamp boxes for the EM are expected to be the first items to be machined starting in mid July. Effort has begun to create a detailed TSU/EM mechanical design and fabrication schedule for all required pieces and alignment fixtures.

PDL has been received, but problems persist in getting it running on the MODCOMP. (Solved as of 7/10/79). After PDL becomes operational the GSE software will be documented. A preliminary PDL listing of the instrument software was completed in June and is now being reviewed.

Design of several subsystems of the GSE was completed in June and wirewrap was begun. Some portions are now complete and are awaiting delivery of line drivers and receivers. The GSE schedule has been fine tuned to provide the portion required to support early EM subsystem tests (i.e. system controller/detector controller checkout) and defer other subsystems (i.e. power bus simulator) until later. A technician has been reassigned from Space Astronomy to assist in GSE assembly.

Design of the shipping container, handling fixture (dolly), and sling for the TSU has begun. The handling fixture will interface with surrogate registration fittings. These surrogate fittings can be attached to the HSP with or without the registration fittings attached. The handling fixture will allow 360° rotation of the HSP and will provide the mechanical interface to the star simulator. The sling will use the GSE hardpoints and one additional hardpoint at the SSE hardpoint location to move the HSP between the handling fixture and shipping container or other fixture. The mechanical GSE is being designed to be independent of the registration fittings because of the uncertainty in delivery date of fittings from PE.

A revised and nearly final parts list was issued in June. Purchase orders for flight parts are expected to begin to be issued in July and be nearly complete in August.

A six week review was held at GSFC in June. No major problems were identified. The parts program was discussed and parts available from GSFC stock identified. The TSU test program was also discussed and the electrical interface was agreed upon.

The remodeling of the HSP subassembly and GSE assembly area was completed in June. The remodeling of the clean room and C&DH simulator area are in the detailed planning stage.

B. Schedule Section

The milestone status as of 7/11/79 is attached. The schedule is now in the process of a major revision to incorporate the following changes:

1. Delivery date of the TSU to GSFC of 1-11-80
2. TSU and fixture machining schedule detail
3. Partial completion of GSE to support digital electronics breadboard (wirewrap) tests
4. Latest TSU test schedule (preliminary)

It is expected that the revised schedule will be ready for inclusion in next month's report. The TSU delivery date is not expected to slip. Engineering model test data is expected in time to support CDR.

C. Problem Areas

The major concern at this time is the machining and assembly time required for the TSU and associated fixtures. There is little slack left in the TSU schedule.

The alignment plan for flight instruments in the flight FPS has not been defined and is therefore an item of concern.

D. Science Section

The position of the Image Dissector tubes was changed slightly in June. The off-axis tubes were positioned parallel to the V1 axis to simplify layout and design with negligible effect on image quality. The polarimetry tube was tilted to bring its cathode closer to tangential to the focal plane.

E. Documentation Section

A hazard analysis for the HSP was prepared by GSFC, reviewed, and submitted to LMSC in June. Delivery of the reduced structural math model (SE-03) is expected in July. The HSP instrument description, preliminary,(SE-01) is now scheduled for delivery on September 15.

F. CCB Activity

STR-02A PSCN status

15R1	Approved 6/15 --no impact	(HSP RECP 0005* superseding 0005 dated 4/9)
17	Received 6/25	
19	Approved 6/4 --no impact	
20	Approved 6/13 --no impact	

STR-02A PSCN status (cont.)

21	Approved 6/22 with suggested change to title of Figure 3.1.2.1-1 --no impact
22	Approved 6/27 --no impact (HSP RECP 0006)
23	Approved 6/19 --no impact

Axial OTA/SSM ICD PIRN status

2006	Approved 6/13 --no impact
2007	Not approved 6/22 --rewording requested
2009	Approved 6/25 --no impact
2010	Approved 6/27 --with comments on para.s 3.7.8.2, 3.7.9.3, and 3.7.9.7
2014	Received 6/19
2018	Received 6/27

HSP MILESTONE STATUS 7/10/79

STONE	NEW XX CHANGE X	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
3a	X	5/14	Order PMT		8/1	Need spec.
6		3/7	Optical parts specified	5/28	6/1	Not critical
8		3/12	DCP BB design	4/10		
8a	X	6/4	DCP wirewrap list complete	7/2	6/22	PLR changes
9	X	3/29	Optical parts ordered		8/1	Not critical
10		4/2	Coarse NASTRAN results	4/11	4/16	
11		4/4	BB tests complete	4/20	4/20	
12		4/5	Prelim.subsystem box design	4/16	4/16	
13	XX	5/9	RIU, I/F design		7/20	I/F info recd lat
13a		5/23	Science interface design	6/8	5/28	
13b	XX	5/9	DMA I/F card design	6/8	6/8	
13c	XX	5/7	Parallel I/F card design		7/11	In drafting
14		4/4	Cable layout	5/18	5/7	
15		4/9	PAD PLR	4/12	4/12	
15a		5/3	CVC,deflection amp. PLR	5/15	5/15	
16-1	X	4/17	DCP BB		7/23	
16-2	X	4/17	DCP BB test box	7/2	6/25	None required
16-3	X	4/17	DCP test software	7/2	6/25	Comp.except doc.
17		4/17	IDT PRR	5/22	5/25	
18	X	5/4	NASTRAN--detailed model	7/9	6/25	Model compl.
19	X	5/4	DEA box design		7/18	PLR changes
19a	X	5/21	Pwr Distrib. Unit box design	7/1		In PCDS
19b	X	5/7	Signal Distrib. Unit box design		TBR	Needs definition
19c		8/6	System controller box design		8/6	
19d		6/10	Preamp. box design		7/18	Connector changes
20-1		6/25	PWB layout compl.for CVC and defl.amp		7/27	
20-2		6/25	PWB layout complete for PAD		7/27	
21		5/14	Detailed mechanical design		TBR	Will be detailed

22	X	5/22	Flight parts ordered		8/22	PLR changes
23	X	5/28	DCP hardware debugged		8/6	
24	X	5/29	Cable harness layout complete		7/27	
25-1	XX	8/2	Fab.RIU interface		8/24	Delayed for 13
25-2		8/2	Fab.science interface		8/2	Fab.compl.short parts
25-3	XX	8/2	Fab. PBS		10/8	
25-4		8/2	GSE software		8/2	
25-5	X	8/2	Fab. DMA I/F card		8/2	Fab.compl.short parts
25-6	X	8/2	Fab. parallel I/F card		8/2	
25-7	XX	8/2	Fab. TCB		11/7	
26		7/2	GSE subsystem tests		8/19	
27-1	X	7/9	EM parts received	7/9	7/9	Ex.line drivers, recv.ers,1% resis
27-2	X	7/9	PWB received		8/9	
27-3	X	7/9	DEA boxes received		9/12	
27-	XX	7/9	PDU box received		PDU eliminated	
27-5	X	7/9	SDU box received		TBD	
27-6	X	7/9	Preamp. box received		9/12	
28-1	X	7/23	GSE hardware complete		12/1	
28-2		7/23	HSP EM software		8/2	
29	X	8/6	DCP software debugged		10/1	
30	X	8/6	EM subsystem complete		9/12	
31		8/15	HVPS EM received		10/16	
31a		8/15	IDT EM		11/12	
31b		12/14	IDT/HVPS test complete		12/14	
32		8/15	TSU shipping container design		8/15	
33		8/20	TSU mass simulator design		8/20	
34-1	X	8/29	DCP BB test complete		9/17	
34-2		8/29	Syst. controller wire harness design		8/29	

35		9/4	GSE test complete	9/23	
36-1	X	9/4	Test EM subsystem	10/10	
36-2	X	9/4	EM cable harness	10/10	
37-1		9/4	Fab. TSU structure	TBR	Will be detailed
37-2	X	9/4	Build TSU handling fixture/sling	9/4 (TBR)	
38		9/15	TSU GSE design complete	9/15	
39-1		10/1	EM hardware integrated	11/1	
39-2		10/1	EM software complete (8080)	11/1	
40		10/10	MLB layout complete	11/12	
41-1		10/17	Build TSU subsyst.mass simulator	TBR	
41-2		10/17	TSU structure/wire harness assembled	TBR	
42		10/28	EM debug complete	11/22	
43-1		11/20	Integrate TSU	11/20	
43		11/20	Fab. TSU shipping container	11/20	
43-3		11/20	TSU GSE built	11/20	
44-1		12/3	Fab. of syst.controller box complete	12/3	
44-2		12/3	Fab. MLB	12/3	
45-1		12/17	EM IDT installed	12/17	
45-2		12/17	EM PCDS installed	12/17	
45-3		12/17	Initial test EM complete	12/17	
46		1/10/80	EM syst.contrlr,detect.contrlr.fab.compl.	1/10/80	
47-1		1/23/80	EMI tests EM	1/23/80	
47-2		1/23/80	EM DCP test complete	1/23/80	
48		3/3/80	EM test	3/3/80	
49	XX	6/15	PBS design complete	8/22	
49-1	XX	6/15	TCB design complete	10/24	

50	X	7/16	Star Simulator electrical design		9/26
51	X	8/27	Star Simulator electr.fab.complete		11/7
52	X	5/9	DCP PPLR	5/9	5/9
53		6/20	TSU handling fixture/sling design		TBR

Don Johnson

DR-MA-02 Number 16
Issued: August 20, 1979

Monthly Report

for

July 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The major effort in July was concentrated in the area of interface definition due to the various TIMs, C&DH PRR, and IFWG meetings held during the month.

The analog electronics PWB layout and tape-up effort was completed (except for the preamp, to be completed in early August) in July. After photo work, the boards will be ordered and are expected in late August. Engineering model parts are on hand with few exceptions, primarily the line drivers.

Wire wrap was completed in July for the system controller and detector controller boards. Checkout and debugging was started and will continue in August.

All subcontractors appear to be proceeding on schedule with the exception of the HVPS which is subject to delay pending receipt of a hermetic connector, now scheduled for October.

The NASTRAN structural model was completed in July and a reduced model was delivered to GSFC. All stresses are low and first mode frequency is well within the ICD limit. There appear to be no difficulties in the structural design approach according to the model.

Detailed mechanical layout and piece part design continued in July. Material for the TSU and assembly fixture was ordered and 60% received by the end of the month.

The time required for detailed planning and scheduling has been extended because of a change in plans. Various local machine shops were contacted and advised of our requirements. Only one was found that could handle the large pieces and meet the required tolerances. The selected shop uses numerically controlled machines. The use of NC machinery for the larger pieces and pieces that are required in quantity must now be considered in the schedule. To take full advantage of the economies of scale offered by the use of NC machinery will, for example, mean that the TSU electronics boxes will be identical to the PFU boxes rather than simplified versions as was originally planned. The detailed schedule is expected to be completed in August.

The work on a new detailed thermal model began in July at A.O. Smith with Chuck Wiggins in attendance. Preliminary results are expected in late August.

The GSE fabrication and assembly work continued in July with no major difficulties. Several subassemblies are complete and are awaiting parts (line drivers).

Mechanical GSE design continued in July. Some changes in the shipping container design approach are being considered. The handling fixture/dolly may be part of the shipping container. This would eliminate one transfer operation prior to shipping and one after delivery.

The operation of the Software Working Group has become an item of major concern. It is not clear what interface the SWWG is controlling, if any, or by what

means. The SWWG meetings do not appear to be organized to permit effective action. Our representative, for example, was prepared prior to the last meeting to discuss DM-06 line by line as advertised in the agenda. At the meeting, however, the groundrules for reading and interpreting DM-06 were changed. The confusion generated by the SWWG is distracting from our software effort and is therefore an item of increasing concern.

The HSP power and weight budgets remain as previously reported.

B. Schedule Section

The major revision discussed in last month's report is not yet complete because of the additional time required to properly rephase the mechanical fabrication and assembly schedule. A revised schedule is now expected prior to the August report. Milestones completed in July are as follows:

	Milestone Number	Date	
1.	(unnumbered)	7/19	Delivery of reduced NASTRAN model
2.	13c	7/20	Parallel interface card design
3.	19	7/18	DEA box design
4.	20-1	7/25	PWB layout for CVC and defl.amp.
5.	20-2	7/25	PWB layout for PAD

C. Problem Areas

The following areas have been discussed in this and previous reports:

1. HVPS connector delivery,

2. PFU alignment plan (ST alignment),

3. Delivery of line drivers/receivers,

4. Software Working Group.

D. Science Section

There are no new major items of concern to report for July.

E. Documentation Section

The reduced structural math model (SE-03) was delivered in July. There are no other changes to report.

F. CCB Activity

STR-02A PSCNs		Action
17	OTA/SSM Alignment	Disapproved 7/27 (approved at IFWG 8/1)
24	Para. 3.1.3.2.2	Received 7/24 (" " " ")

ICD-02 PIRNs		Action
2019	New Sections 3.2, 3.3, 3.5	Received 7/2
2017	SI Connectors	Received 7/25
2020	Load Factors	Received 7/30

Don Johnson

DR-MA-02 Number 17
Issued: Sept. 12, 1979

Monthly Report

for

August 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W. Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The first engineering model PWBs for the analog electronics were received in late August with the rest expected to follow in September. Two engineering model Detector Electronics Assemblies (DEA) will be built, one each for the engineering model PMT and IDT. The first current to voltage converter board subassembly is complete except for two resistors and a connector. The second unit will be built after the first unit is tested. The engineering model deflection amplifier, focus amplifier, PAD, and preamp will be built in September. Tests will begin on each PWB subassembly as it is completed.

The checkout and debugging effort continued on the system controller in August. It has been interfaced successfully to the MDS. At the end of the reporting period the effort was concentrated in the RAM mapping function. The detector controller wire wrap board was completed, but a large number of errors were found during the initial debugging. Because of this and a change in the A/D converter, a new detector controller wire wrap board was begun and is expected to be complete in mid-September.

The change in the A/D converter is the use of an Analog Devices (AD572SD/883B) hybrid A/D converter in place of the present circuit using discrete parts. The performance including power consumption is nearly identical to the discrete design. It offers the advantage of a built-in reference voltage in addition to a reduction of a large number of parts. The detector controller with the hybrid A/D is expected to be completed in September.

There are no major changes or problems to report at any of the subcontractors. The schedule limiting item for the engineering model HVPS is still the hermetic connector.

The fabrication details of the TSU, assembly fixtures, engineering model electronics boxes, handling fixtures, and shipping container have now been scheduled in detail. Plans have been established which identify where and when each major piece will be made. Several shops will be working in parallel: SSEC, Space Astronomy, Engineering, and an outside private concern in the local area. This plan is reflected in the new schedule included in this report. All aluminum has been ordered for the TSU engineering model electronics boxes, and handling fixtures.

Work on the new thermal model continued at A.O. Smith during the month with Chuck Wiggins (ORI/GSFC) in residence most of the time. The thermal model is separate from but based on the NASTRAN structural model. The thermal model is a simplified (approximately 800 grid points) version of the structural model (approximately 1500 grid points). The grid point numbers are identical to facilitate use of the thermal model output as input to the structural model for thermal displacement calculations. At the end of the month the radiation matrix was being debugged and preliminary case run results are expected in mid September.

Work on GSE subassemblies continued in August and some of the long awaited line drivers were received at the end of the month. Since the parts just arrived, the debug and test schedule details have not been worked out.

A review of GSE Software (LSI-11) was held in August during which the PDL output was discussed in detail. A similar review for instrument software (8080 and NSSC-1) will be held in September. There are no identified internal problems in the software area. The operation of the Software Working Group and the intentions for DM-06 continue to be an item of concern.

During the C&DH IFWG in late August we learned two things that cause us great concern. The first is that there are plans to supply us with only one engineering model RIU/EU. Our engineering model is being built with a fully redundant system controller which has a complex interface with both RIUs. One of the objectives of the engineering model is to fully test this interface. The second problem is the lack of a bus coupling unit (BCU) in the C&DH simulator. The bus interface requires the SI load to be equal to two RIU loads. Our test connector interface adds a third load so the present C&DH simulator interface will not work with the HSP. Action is required to relieve these two problems.

TSU test plans are being developed by GSFC for our review. There are two major areas of concern: The design of the thermal vacuum chamber may not allow a clear test of the thermal interface as defined in the ICD. In our view too many details of the FPS hardware are being simulated. The greater concern is the lack of an SI alignment plan from PE prevents an enlightened selection of an external reference point on the HSP. One purpose of the TSU test is to correlate optical/detector (interior) alignment with a point on the exterior of the HSP. The ideal point to select would be the point to be used for SI alignment checks after FPS installation. Since this is an unknown a major TSU test objective will be compromised. An SI alignment plan from PE is urgently and immediately needed.

The weight and power budgets are included as appendices to this report. The HSP weight is now estimated to be 581.2 lbs. Using the weight contingency depletion schedule, the required contingency is 22.89 lbs. (Present weight plus contingency is 604.1 lbs). The 4.1 pounds is presently less than the error of the estimate so no action is planned to reduce weight at this time. The TSU is scheduled for completion in January at which time the HSP weight will be more firmly established. If actual TSU weight exceeds 600 lbs, reductions can be made in the forward and aft bulkheads and other areas before the PFU is built. Weight reduction activity at this time would seriously impact the TSU schedule. The proper action will be clearer when the TSU is complete in January.

The power budget is in a new format which incorporates an efficiency model of the PCDS. Total power is 2.8 watts less than reported in June.

B. Schedule Section

The revised schedule is attached. GSE milestones are subject to further refinement since parts have been received.

C. Problem Areas

The major concerns have been previously discussed: Software Working Group,

need for two EM RIUs, need for a BCU, and the lack of an instrument alignment plan. The construction schedule for the C&DH simulator room is becoming a problem and will be the subject of attention over the next several months.

D. Science Section

A meeting of the Investigation Definition Team is planned for early September. A major topic will be observation modes.

E. Documentation Section

There are no changes except for the Instrument Description (SE-01) which was scheduled for delivery in September. The document is being assembled and will likely be available in October.

F. CCB Activity

STR-02 PSCN	Action
17	Approved 8/1
22	Approved 8/1
24	Approved 8/1
"Z"	Approved subject to rewording of 3.2.8.2 8/23

OTA/SSM ICD PIRN	Action
2020	Approved 8/9
2014 - 2019	Superseded by action of the July 30-31 IFWG and were incorporated in the ICD. We therefore consider these PIRNs closed.

High Speed Photometer Weight Budget (9/10/79)

Reference: 1) HSP 6/11/79 Weight Budget
2) "Space Telescope Weight Control Plan"

		Last Reported Weight	Present Weight	Change	Design Maturity Code	% Required Contingency	Required Contingency Wgt	Notes
1.	Main Spar	45	45.7	+0.7	PR	3	1.37	1
2.	Main Spar Stiffeners (6)	12	7.6	-4.4	PR	3	0.23	2
3.	Electronics Base Plate (EBP)	40	43.0	+3.0	CR	1	0.43	1
4.	Main Spar/ EBP Interface	7	4.3	-2.7	PR	3	0.13	1
5	Forward Bulkhead	20	41.9	+21.9	PR	3	1.26	2,3
6.	Aft Bulkhead	20	30.4	+10.4	PR	3	0.91	2,3
7.	Interior Bulkheads (4 sets of 2)	35	29.7	-5.3	PR	3	0.89	1
8.	Free Corner Bulkhead Ties	9	6.4	-2.6	PR	3	0.19	2
9.	Outside Skin	62	61.3	-0.7	CR	1	0.61	1
10.	Electrical Connector Plate	3	3.0	0.0	PR	3	0.09	
11.	Forward Registration Fitting	9	6.2	-2.8	PR	3	0.19	2
12.	Aft Registration Fitting	12	8.7	-3.3	PR	3	0.26	2
13.	GSE Brackets (6)	20	20.0	0.0	PR	3	0.60	
14.	Crewman Handhold Brackets (4 sets)	0	15.0	+15.0	PR	3	0.45	4
15.	Conductor Panels and Angles (2)	31	40.4	+9.4	PR	3	1.2	2
16.	Longitudinal Fiberglass Angles (6)	4	7.6	+3.6	PR	3	0.23	2
17.	Longitudinal Aluminum Angles (3)	2.5	2.5	0.0	PR	3	0.08	
1	Conductor Panel Bulkheads (6)	5	7.5	+2.5	PR	3	0.23	2
19.	ODS Closeout Bulkheads (3)	2.5	5.0	+2.5	PR	3	0.15	2

		Last Reported Weight	Present Weight	Change	Design Maturity Code	% Required Contingency	Required Contingency Wgt	Notes
20.	Cable Harness	20	24	+4.0	PR	8	1.9	1
21.	Fasteners and Brackets	10	10	0.0	E	18	1.8	
22.	DEAs for IDTs and PMT (5)	40	40	0.0	PR	8	3.2	
23.	System Controller	15	15	0.0	CL	8	1.2	
24.	PCDS	17	17	0.0	CL	8	1.36	
25.	SDU	8	6	-2.0	E	18	1.08	1
5.	RIU (2)	13	13	0.0	Spec.	0	0.0	
27.	Heaters and Paint	15	5	-10.0	E	18	0.9	1
28.	ODS	60	65	+5.0	Spec./ EL/PR	3	1.95	1
			581.2				22.89	

Summary

Launch Limit Weight	600.00	Present Weight	581.2
Required Contingency	22.89	Present Contingency	18.80

Notes

1) Refined calculation

2) Redesign

3) The previous 20 lbs was based on a layout which was sized from our NASTRAN structural model. Further detail in layout indicated that many pads were needed to pick up fasteners and associated hardware. It was also found that the depth of cut assumed in the 20 lb estimate had to be reduced for machining tolerances to be maintained; thus, a thicker web and more weight was added.

4) Item erroneously left out of 6/11/79 Weight Budget (original estimates indicated minor weight impact).

HSP MONTHLY POWER SUMMARY

COLD CONDITION (WATTS)

OPERATE	107.1
STANDBY	85.2
HOLD	41.9
LEVEL III CEI	140 - 105 - 32

- -

ASSOCIATE CONTRACTION MONTHLY POWER USAGE REPORT--HIGH SPEED PHOTOMETER

(WATTS)

ITEM	COLD OPERATE	HOT OPERATE	COMMENTS
Current Power Usage	107.1	91.1	
% Estimated	15.0	0.0	
% Calculated	85.0	100.0	
% Measured	0.0	0.0	
Power Usage Contingency	32.9	48.9	
Pending Changes	0.0	0.0	
Potential Changes	0.0	0.0	
Projected Power Usage	140.0	140.0	
Pending Items	NONE		
Potential Items	NONE		
Comments	NONE		

HSP POWER BUDGET 9-11-79

OPTICAL DETECTOR SUBSYSTEM (ODS)

MINIMUM VALUES		INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	1888.	1888.	1805.	5	9441.	9441.	9026.
IDT ASSEMBLY								
DIVIDER		0.	0.	83.	4	0.	0.	332.
FOCUS COIL		0.	0.	937.	4	0.	0.	3748.
HORIZ DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
VERT DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL IDT ASSEMBLY		127.	127.	1147.		510.	510.	4590.
PMT ASSEMBLY								
DIVIDER		0.	0.	83.	1	0.	0.	83.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	210.		127.	127.	210.

MINIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 13827.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	9441.
IDT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	9441.

OPTICAL DETECTOR SUBSYSTEM

NOMINAL VALUES

		INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	1979.	1979.	1819.	5	9894.	9894.	9094.
IDT ASSEMBLY								
DIVIDER		0.	0.	160.	4	0.	0.	640.
FOCUS COIL		0.	0.	1177.	4	0.	0.	4708.
HORIZ DEFLECTION COIL		0.	0.	17.	4	0.	0.	68.
VERT DEFLECTION COIL		0.	0.	20.	4	0.	0.	80.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL IDT ASSEMBLY		127.	127.	1501.		510.	510.	6006.
PMT ASSEMBLY								
DIVIDER		0.	0.	160.	1	0.	0.	160.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	287.		127.	127.	287.

NOMINAL TOTALS - OPTICAL DETECTOR SUBSYSTEM — TOTAL DISSIPATION 15388.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	9894.
IDT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	9894.

OPTICAL DETECTOR SUBSYSTEM

MAXIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	2100.	2100.	1837.	5	10500.	10500.	9185
IDT ASSEMBLY								
DIVIDER		0.	0.	263.	4	0.	0.	1052.
FOCUS COIL		0.	0.	1665.	4	0.	0.	6660.
HORIZ DEFLECTION COIL		0.	0.	69.	4	0.	0.	276.
VERT DEFLECTION COIL		0.	0.	81.	4	0.	0.	324.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	57.				270.		
TOTAL IDT ASSEMBLY		127.	127.	2205.		510.	510.	8822
PMT ASSEMBLY								
DIVIDER		0.	0.	263.	1	0.	0.	263.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	57.				67.		
TOTAL PMT ASSEMBLY		127.	127.	390.		127.	127.	390

MAXIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM — TOTAL DISSIPATION 18397

	SECONDARY DC UTILIZATION						
	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	10500.
IDT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
DDS TOTAL	300.	337.	0.	0.	0.	0.	10500.

DETECTOR ELECTRONICS ASSEMBLY

MINIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	4	900.	3720.	3720.
	M15T	552.				2610.		
	P5T	52.				210.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	4	84.	221.	221.
	M15T	7.				27.		
	P5T	27.				110.		
FOCUS AMPLIFIER	P15T	1050.	2130.	1193.	4	4200.	8520.	4772.
	M15T	1080.				4320.		
HORIZONTAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
VERTICAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
DETECTOR CONTROLLER	P15T	684.	5758.	5768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		9968.	9958.	9031.		39871.	39871.	36123.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	1	225.	930.	930.
	M15T	552.				652.		
	P5T	52.				52.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	1	21.	55.	55.
	M15T	7.				7.		
	P5T	27.				27.		
DETECTOR CONTROLLER	P15T	684.	5758.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7754.	7754.	7754.		7754.	7754.	7754.

MINIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY — TOTAL DISSIPATION 43877.

	SECONDARY DC UTILIZATION						
	P15T	M15T	P5T	P12D	P5D	M5D	23P
IDT ELECTRONICS	8112.	12969.	18790.	0.	0.	0.	0.
PMT ELECTRONICS	930.	2126.	4697.	0.	0.	0.	0.
DEA TOTAL	9042.	15095.	23487.	0.	0.	0.	0.

DETECTOR ELECTRONICS ASSEMBLY

NOMINAL VALUES		INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	4	900.	3720.	3720.
	M15T	652.				2610.		
	P5T	52.				210.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	4	84.	221.	221.
	M15T	7.				27.		
	P5T	27.				110.		
FOCUS AMPLIFIER	P15T	1170.	2385.	1208.	4	4680.	9540.	4832.
	M15T	1215.				4860.		
HORIZONTAL DEFLECTION AMP.	P15T	241.	258.	241.	4	963.	1032.	964.
	M15T	17.				69.		
VERTICAL DEFLECTION AMP.	P15T	219.	236.	216.	4	876.	945.	865.
	M15T	17.				69.		
DETECTOR CONTROLLER	P15T	684.	5768.	5768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		10633.	10633.	9419.		42532.	42532.	37676
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	1	225.	930.	930.
	M15T	652.				652.		
	P5T	52.				52.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	1	21.	55.	55.
	M15T	7.				7.		
	P5T	27.				27.		
DETECTOR CONTROLLER	P15T	684.	5768.	5768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7754.	7754.	7754.		7754.	7754.	7754

NOMINAL TOTALS - DETECTOR ELECTRONICS ASSEMBLY — TOTAL DISSIPATION 45430

	SECONDARY DC UTILIZATION						
	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	10239.	13503.	18790.	0.	0.	0.	0.
PMT ELECTRONICS	930.	2126.	4697.	0.	0.	0.	0.
DEA TOTAL	11169.	15629.	23487.	0.	0.	0.	0.

DETECTOR ELECTRONICS ASSEMBLY

XIMUM VALUES		INDIVIDUAL UNI			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMP.UN AT DISSIPATION
IDT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	4	900.	3720.	3720.
	M15T	652.				2610.		
	P5T	52.				210.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	4	84.	221.	221.
	M15T	7.				27.		
	P5T	27.				110.		
FOCUS AMPLIFIER	P15T	1395.	2805.	1140.	4	5580.	11220.	4560.
	M15T	1410.				5640.		
HORIZONTAL DEFLECTION AMP.	P15T	393.	409.	340.	4	1572.	1638.	1362.
	M15T	16.				66.		
VERTICAL DEFLECTION AMP.	P15T	423.	439.	358.	4	1692.	1758.	1434.
	M15T	16.				66.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		11408.	11408.	9593.		45631.	45631.	38371.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	1	225.	930.	930.
	M15T	652.				652.		
	P5T	52.				52.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	1	21.	55.	55.
	M15T	7.				7.		
	P5T	27.				27.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7754.	7754.	7754.		7754.	7754.	7754.

MAXIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY — TOTAL DISSIPATION 46125.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	12554.	14277.	18790.	0.	0.	0.	0.
PMT ELECTRONICS	930.	2126.	4697.	0.	0.	0.	0.
DEA TOTAL	13494.	16403.	23487.	0.	0.	0.	0.

SYSTEM CONTROLLER

MINIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MINIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

NOMINAL TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

SYSTEM CONTROLLER

MAXIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MAXIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

POWER CONVERTOR AND DISTRIBUTION SUBSYSTEM (PCDS)

MINIMUM	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	13969.	3874.	10095.	4	55875.	15494.	40381.
DETECTOR SUPPLY (PMT)	10549.	2768.	7881.	1	10649.	2768.	7881.
DIGITAL SUPPLY	39546.	16697.	22849.	1	39546.	16697.	22849.
PREREGULATOR	10558.	1117.	9441.	1	10558.	1117.	9441.
TOTAL	74722.	24455.	50267.		116629.	36076.	80552.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	8112.	12969.	18790.		
IDT TOTAL	3352.	13239.	18790.	40381.	55875.
PMT ASSEMBLY	60.	57.	0.		
PMT ELECTRONICS	930.	2125.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	10649.
TOTAL	9342.	15433.	23487.	48262.	66523.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	39546.
TOTAL	1104.	21720.	25.	22849.	39546.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	9441.	10558.
TOTAL	9441.	10558.

POWER CONVERTOR AND DISTRIBU. JN SUBSYSTEM (PCDS)

NOMINAL	INDIVIDUAL JNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	14967.	4205.	10760.	4	59867.	16825.	43042.
DETECTOR SUPPLY (PMT)	10649.	2768.	7881.	1	10649.	2768.	7881.
DIGITAL SUPPLY	39546.	16697.	22849.	1	39546.	16697.	22849.
PREREGULATOR	11064.	1170.	9894.	1	11064.	1170.	9894.
TOTAL	75226.	24841.	51385.		121127.	37460.	83666.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	10239.	13503.	18790.		
IDT TOTAL	10479.	13773.	18790.	43042.	59867.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	930.	2126.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	10649.
TOTAL	11469.	15967.	23487.	50923.	70514.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	39546.
TOTAL	1104.	21720.	25.	22849.	39546.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	9894.	11064.
TOTAL	9894.	11064.

POWER CONVERTOR AND DISTRIBUTION SUBSYSTEM (PCDS)

MAXIMUM

	INDIVIDUAL UNIT			NO. OF UNITS	TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER		S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	16129.	4594.	11535.	4	64515.	18374.	46141.
DETECTOR SUPPLY (PMT)	10649.	2768.	7881.	1	10649.	2768.	7881.
DIGITAL SUPPLY	39546.	16697.	22849.	1	39546.	16697.	22849.
PREREGULATOR	11741.	1241.	10500.	1	11741.	1241.	10500.
TOTAL	78066.	25300.	52765.		126452.	39081.	87371.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	12564.	14277.	18790.		
IDT TOTAL	12804.	14547.	18790.	46141.	64515.
PMT ASSEMBLY	60.	57.	0.		
PMT ELECTRONICS	930.	2125.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	10649.
TOTAL	13794.	16741.	23487.	54022.	75163.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	39546.
TOTAL	1104.	21720.	25.	22849.	39546.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	10500.	11741.
TOTAL	10500.	11741.

DISSIPATION POWER BALANCE

	MINIMUM	NOMINAL	MAXIMUM
HSP (LESS RIU) POWER INPUT	116629.	121127.	126452.
ODS	13827.	15388.	18397.
DETECTOR ELECTRONICS	43877.	45430.	46125.
SYSTEM CONTROLLER	22849.	22849.	22849.
PCDS	36076.	37460.	39081.
SUBASSEMBLY TOTALS	116629.	121127.	126452.

NOMINAL POWER FOR VARIOUS OPERATING MODES (NOT INCLUDING RIU/EU)

COMMON ELECTRONICS	39546.
IDT DETECTOR	17180.
PMT DETECTOR	12862.

CONTINGENCY

ALLOWABLE SI POWER	145000.
LESS RM/EU POWER	5000.
ALLOWABLE HSP POWER	140000.
PRESENT HSP POWER	121127.

CONTINGENCY (140000/121127.-1)*100= 15.58 PERCENT
(NOTE: THIS CONTINGENCY IS BASED ON ALL FIVE DETECTORS OPERATING)

NOTES:

1. ALL POWER GIVEN IN MILLIWATTS

2. MINIMUM, NOMINAL, AND MAXIMUM VALUES ARE BASED ON OPERATING MODES OF TYPICAL UNITS ONLY. THEY DO NOT INCLUDE UNIT TO UNIT VARIATIONS.

3. OPERATING CONDITIONS, WITH ALL DETECTORS SIMULTANEOUSLY POWERED WILL BE SUCH THAT THE TOTAL POWER CONSUMPTION WILL RARELY EXCEED THE NOMINAL VALUES IN THE BUDGET

4. POWER SUPPLY EFFICIENCY EQUATIONS USED IN THIS BUDGET ARE AS FOLLOWS:

   DETECTOR SUPPLY: S/C BUS POWER=
   1.50+ 1.50*(+15 VOLT POWER)+ 1.50*(-15 VOLT POWER)+ 1.25*(+5 VOLT POWER)

   DIGITAL SUPPLY: S/C BUS POWER=
   2.00+ 1.55*(+12 VOLT POWER)+ 1.74*(+5 VOLT POWER)+ 1.25*(-5 VOLT POWER)

   PREREGULATOR: S/C BUS POWER=
   2.50+ 1.12*(+28 VOLT POWER)

ST/HSP SCHEDULE 9/10/79

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		9-13	Box beam design complete			
2-1		10-11	Box beam machining compl.			
2-2		10-11	Box beam assy fixture compl.			
3-1		10-25	Box beam assy complete			
3-2		10-25	Electronics baseplate recd.			
4-1		11-8	EPB/Box beam assy complete			
4-2		11-8	Internal bulkheads received			
4-3		11-8	Forward bulkheads received			
4-4		11-8	Aft bulkheads received			
5-1		11-29	TSU bulkhead assy complete			
5-2		11-29	GSE hard pts/supports recd.			
6-1		12-3	TSU lower frame assy compl.			
6-2		12-3	Brackets/tubes/ODS structure received			
6-3		12-3	ODS conductor panel received			
7		12-22	TSU assembled			
8		1-9	TSU shipped to GSFC			
9		4-14	TSU tests complete--shipped to U.W.			
10		6-2	CDR Data Package submitted			
11		6-17	CDR			
12		9-20	Tooling/fixture design compl.			
13		10-1	Main structure fixture compl.			
14		8-31	Elec.baseplate design compl. 9/10			
15		9-20	Elec.baseplate (EPB) programming complete			
16		10-18	EPB machining complete			
17		9-20	Internal bulkhead design compl.			
18		10-4	Internal bulkhead programming complete			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1.		10-18	Internal bulkhead machining complete			
20		10-4	Forward bulkhead design complete			
21		10-18	Forward bulkhead programming complete			
22		11-1	Forward bulkhead machining complete			
23		10-18	Aft bulkhead design compl.			
24		10-25	Aft bulkhead programming complete			
25		11-8	Aft bulkhead machining complete			
26		9-13	Registration fitting support design complete			
27		10-25	Registration fitting support machining complete			
28		10-11	GSE hardpoint design compl.			
29		11-29	GSE hardpoint machining complete			
30		10-11	ODS subassy design complete			
31		11-15	ODS subassy machining compl.			
32		10-4	ODS conductor panel design complete			
33		11-8	ODS conductor panel fab.compl.			
34		11-25	Outer panel design complete			
35		12-22	Outer panel fab.complete			
36		9-31	DEA box design complete	9/10		
37		10-11	DEA box machining complete			
38		9-13	PCDS TSU design complete			
3		10-4	PCDS TSU fab. complete			
40		10-4	System controller box design complete			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
41		10-25	System controller box machining complete			
42		10-25	SDU box design complete			
43		11-1	SDU box machining compl.			
44		10-11	Preamp box design compl.	9/10		
45		11-1	Preamp box machining compl.			
46		11-1	HVPS TSU design complete			
47		11-22	HVPS TSU fab. complete			
48		10-11	Handling fix/sling design complete			
49		11-22	Handling fix/sling fab. complete			
50		11-22	Shipping container design complete			
51		12-27	Shipping container manuf. complete			
52		9-21	PAD PWB assembled			
53		10-12	PAD PWB tested			
54-1		11-1	PAD PWB integrated in DEA			
54-2		11-1	CVC PWB " " "			
54-3		11-1	Deflection amp " " "			
55-1		12-11	DEA test complete			
55-2		12-11	Preamp integ.with DEA			
55-3		12-11	Dectector controller integ. with DEA			
56		12-22	EM (Ø1) debugged			
57		2-19	EM (Ø1) tests complete			
58-1		3-6	PCDS,PMT integ. into EM			
58-2		3-6	IDT,HVPS integ. into EM			
59		4-31	EM (Ø2) tests complete			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
60		7-17	EM detector controller, system controller integ.			
61		8-14	EM tests complete			
62		11-1	Flight MLB received			
63		12-4	Flight system controller assembly complete			
64		10-4	Preamp PWB assembled			
65		10-24	Preamp PWB tested			
66		9-27	CVC PWB assembled			
67		10-27	CVC PWB tested			
68		9-27	Deflect.Amp. PWB assembled			
69		10-23	Deflect.Amp. PWB tested			
70		10-3	Detector controller wire wrap debugged			
71		11-8	Det,ctller wire wrap tested			
72		11-21	Preamp box received			
73		12-6	Preamp assembled and tested			
74		2-1	Detector controller MLB lay-out complete			
75		4-28	Detector controller MLB recd			
76		6-5	EM detector controller compl.			
77		7-7	EM detector controller test complete			
78		9-24	System controller wire wrap debugged			
79		11-8	System controller test compl.			
80		2-1	System controller MLB layout complete			
81		4-28	System controller MLB recd			
82		6-5	EM system controller compl.			
83		7-7	EM system controller test complete			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
84		7-21	Flight PWB received			
85		10-9	Flight analog elec. assembly complete			
86-1		12-1	Flight analog elec. PWB test complete			
86-2		12-1	Flight detector controller assy compl.			
87		12-21	Flight DEA assembly complete			
88		12-17	EM PCDS received			
89		1-21	EM PCDS test compl.			
90		12-17	EM HVPS received			
91		1-17	EM HVPS test compl.			
92		12-13	EM IDT received			
93-1		1-24	EM HVPS integ. with IDT			
93-2		1-24	EM IDT test complete			
94		2-20	EM IDT/HVPS test compl.			
95		12-6	EM PMT received			
96		1-19	EM PMT test complete			
97		8-31	RIU I/F design compl.			
98		9-13	RIU I/F fab. complete			
99		9-27	RIU I/F test complete			
100-1		10-18	RIU I/F installed in GSE			
100-2		10-18	DMA I/F installed in GSE			
100-3		10-18	Science I/F installed in GSE			
100-4		10-18	Parallel I/F installed in GSE			
100-5		10-18	GSE software complete			
101-1		11-7	GSE debug complete			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
[illegible]-2		11-7	PBS integrated			
102-1		12-11	GSE test complete			
102-2		12-11	TCB integrated			
102-3		12-11	Star Simulator integ.			
103		8-31	DMA I/F fab. compl.			
104		10-27	DMA I/F test compl.			
105		8-31	Science I/F fab.compl.			
106		9-27	Science I/F test compl.			
107		8-31	Parallel I/F fab.compl.			
108		9-27	Parallel I/F test compl.			
109		9-6	PBS design complete			
110		10-18	PBS fab. complete			
1[illegible]		11-5	PBS test complete			
112		10-25	TCB design complete			
113		10-21	TCB fab. complete			
114		12-6	TCB test complete			
115		9-17	Star Simulator elec.design complete			
116		10-11	Star Simulator fab.compl.			
117		11-8	Star Simulator test compl.			
118		7-7-80	Mech.dwgs released for PFU machining			
119		10-1-80	PFU machining complete			
120		1-8-81	PFU structure assy compl.			
121		9-20	SDU design complete			
122		10-10	SDU PWB layout compl.			
1[illegible]		11-21	SDU PWB received			
124		12-13	SDU assembly and test complete			

Software Milestones (GSE)

Milestone	Skd Compl.	Description
S1	9-25	GSE real-time system debugged
S2	9-17	Display subsystem complete
S3	9-24	Command subsystem complete
S4	12-20	HSP data base on-line
S5	11-8	Star Simulator module complete
S6	10-10	Display subsystem debugged
S7	10-18	Command subsystem debugged

NOTE: Instrument software milestones are now being detailed

1979 — SEPTEMBER 20 27 | 3 10 17 24 | OCTOBER 1 8 15 22 29 | NOVEMBER 5 12 19 26 | DECEMBER 3 10 17 24 31 | 1980 JANUARY 7 14 21 28 | 4 FEBRUARY 11 18 25 | MARCH 3 10 17 24 31 | APRIL 7 14 21 28 | MAY 5 12 19 26 | JUNE 2 9 16

CATIONS / HOLIDAYS

REVIEWS / MEETINGS — IDT TEST; CDR AVWG; SWVG; AV REV; CDR DATA PKG 10

TSU — 1 BOX BEAM DESIGN; 2 MACHINE BOX BEAM; 3 ASSEMBLE BOX BEAM; 4 EPB/FOR BEAM ASSY; 5 BULKHEAD ASSY; 6 SLOWER PANEL ASSY; 7 FINAL ASSY; 8 TSU CHECKOUT; 8 SHIP TO GSFC; TSU TEST @ GSFC; 9 SHIP TO UW

TOOLING/FIXTURES — DESIGN; 12 MAIN STRUCT; 13 BB ASSY

ELECTRONICS BASE PLATE (EPB) — DESIGN; 14 PROGRAM; 15 MACHINE; 16 MATE; SHIP; SHIP

BULKHEADS: INTERNAL — DESIGN; 17 PROGRAM; 18 MACHINE; 19

FORWARD — DESIGN; 20 PROGRAM; 21 MACHINE; 22

AFT — DESIGN; 23 PG; 24 MACH; 25

FITTINGS

REGISTRATION A+B — DESIGN; 26 MACHINE; 27

ESE — DESIGN; 28 MACHINE (6); 29

ODS

BRACKETS / TUBES / STRUCT — DESIGN; 30 MACHINE; 31

CONDUCTOR PANEL — DESIGN; 32 FABRICATE; 33

PANELS — DESIGN; 34 FABRICATE; 35

ELECTRONICS BOXES (TSU/EM)

DEA (5/2) — 36 PROG/MACH; 37

PCDS (1/0) — DESIGN; 38 FAB; 39

SCDN (1/1) — DESIGN; 40 FAB; 41

SDU (1/0) — DESIGN; 42 FAB; 43

PREAMP (5/2) — DESIGN; 44 PROG/MACH; 45

HVPS (5/0) — DESIGN; 46 PROG MACH; 47

HANDLING FIXTURE / SLING — DESIGN; 48 MANUFACTURE; 49

SHIPPING CONTAINER — DESIGN; 50 MANUFACTURE; 51

ENGINEERING MODEL / ELECTR

PAD (2) — FAB PWB; 52 TEST; 53 ASSEMBLE; 54 TEST DEA; 55 DEBUG EM; 56 TEST EM (#1); 57 INT PCDS, IDT, PMT; 58 TEST EM (#2); 59 FAB FLT PWB

PREAMP (2) — FAB; 64 TEST; 65

CVE (2) — FAB; 66 TEST; 67

DETECTION AMPL (1) — FAB; 68 TEST; 69

DETECTOR CONTROLLER — DEBUG HDW; 70 TEST; 71 INTERFACE; 72 ASSEMBLE/TEST; 73 INT; SOFTWARE

SYSTEM CONTROLLER — DEBUG HDW; 78 TEST; 79

SDU — DESIGN; 121 PWB LAYOUT; 122 FAB PWB; 123 ASSEMBLE/TEST; 124

PCDS — LAYOUT MLB; 74; FAB MLB; 75 BUILD EM DET CONTR; 76

HVPS — LAYOUT MLB; 80; FAB MLB; 81 BUILD EM SYSTM CONTR; 82

IDT — 88 RECEIVE + TEST PCDS; 89

PMT — 90 TEST HVPS; 91

92 TEST IDT; 93 TEST IDT/HVPS; 94

95 TEST PMT; 96

GSE

RIU I/F — DESIGN; 97 FAB; 98 TEST; 99 INTERFACE; 100 DEBUG; 101 TEST; 102

DMA I/F — FAB; 103 TEST; 104

SCIENCE I/F — FAB; 105 TEST; 106

PARALLEL I/F — FAB; 107 TEST; 108 SOFTWARE

PCS — DESIGN; 109 FAB; 110 TEST; 111 FAST

3 — DESIGN; 112 FAB; 113 TEST; 114

STAR SIMULATOR ELECTR — DESIGN; 115 FAB; 116 TEST; 117

C+DH SIM #1

| 1981 | | |

SEC/AD Space Tele. Don Johnson

DR-MA-02 Number 18
Issued: 8 October 1979

Monthly Report

for

September 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W. Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Work continued in the engineering model electronics area in September. The PAD, CVC, deflection amplifier, and preamp PWB subassemblies were completed with the exception of a few high resistance precision resistors, which are expected shortly. Checkout of these subsystems will continue in October. Complete verification of the preamp and PAD requires some degree of packaging to achieve proper stage-to-stage isolation and EMC performance. The required packaging is being built now and is expected to be complete in October. The preamp box schedule has been accelerated at the expense of the DEA box to accommodate an earlier PAD checkout with preamp.

The system controller checkout continued on the first of two wirewrap boards. The second board is expected to be complete by mid-October.

The detector controller wirewrap board was completed in late September. Hardware checkout and debug is underway and will be complete in October.

The PCDS specification is in the process of a complete revision to incorporate all changes accumulated over the past several months. The PCDS is proceeding on schedule. The only area of concern is the latest estimated PCDS weight is six pounds heavier than previous estimates. Efforts are underway to reduce PCDS weight.

There are no new problems with the HVPS or Image Dissector Assembly subcontracts. The HVPS parts list has been recently resubmitted and approved with one part excepted. All GSFC parts branch suggestions involving reliability or quality concerns were adopted.

The PMT proposal was delayed due to schedule problems at Varian,but is now expected in early October.

A part-time student was hired in September to assist with flight part ordering, expediting, and record keeping. At the end of the month the GSFC-supplied parts were being inventoried along with parts from previous programs (OSO, Pioneer Venus). When complete, the parts which must be ordered can be identified. In the meantime, supplier price and delivery information is being verified.

The NASTRAN thermal model was completed in September and several case runs were made. The results of these runs have led to some simplification of the HSP structural design. The first case runs of the thermal model were run with metal-to-metal contact in several areas where insulation was planned. This was done to see if a structurally simpler approach could be made to satisfy thermal interface requirements. This was not done with the previous thermal model because it was not sufficiently detailed to provide the required information. The new model provides for more detailed examination of design alternatives. The results indicated that the most troublesome feature of the thermal design, the isolation of the registration fittings,

could be eliminated at the expense of heater power. The isolation of the bulkheads was also simplified. Because the hold mode power is being increased to 58 watts by elimination of the standby mode, it was decided to trade structural simplicity for heater power. The HSP hold mode power is now 58 watts for the -20°C ICD lower limit and approximately 42 watts for -25°C. This latest design is achieved by isolating the entire front and rear bulkheads from the box beam and electronics base plate. The thin isolated ±V1 panels have been eliminated along with the isolated heated registration fitting interface.

The line drivers and receivers were received in late August for several GSE subassemblies. These have been completed and are in the process of being checked and installed into the GSE. Design effort continues on the power bus simulator and star simulator electronics.

Software effort continued in September with no major problems to report. Several GSE and flight software subtasks were completed on schedule. A flight software review was held in early September.

The concerns expressed in last month's report about the BCU (bus coupling unit) and a second engineering model RIU have both been resolved by discussion with GSFC. A second engineering model RIU will be supplied in early 1980 from SMM spares and a BCU will be provided with the SI C&DH simulator.

TSU test plans were the subject of several meetings between GSFC and UW personnel in September. Plans for the various environmental tests are well along and information is being exchanged to facilitate fixture design and TSU instrumentation installation. It was agreed that the HSP TSU will use existing GSFC heater controllers in lieu of a TSU GSE supplied by UW. The thermal vacuum test is still unresolved,but there is agreement on the possible alternatives. The FOC team will be contacted for information on their STU thermal test plans, which may have application to the resolution of HSP thermal test plans.

B. Schedule

A revised schedule is attached.

C. Problem Areas

The software working group remains a concern as does the lack of an SI alignment plan. The C&DH simulator room construction schedule is also a concern.

D. Science Section

An investigation definition team meeting was held in early September. Various observations were discussed and reviewed with HSP performance specifications to ensure that the HSP will be capable of performing the intended observations. No problems were identified as a result of the meeting.

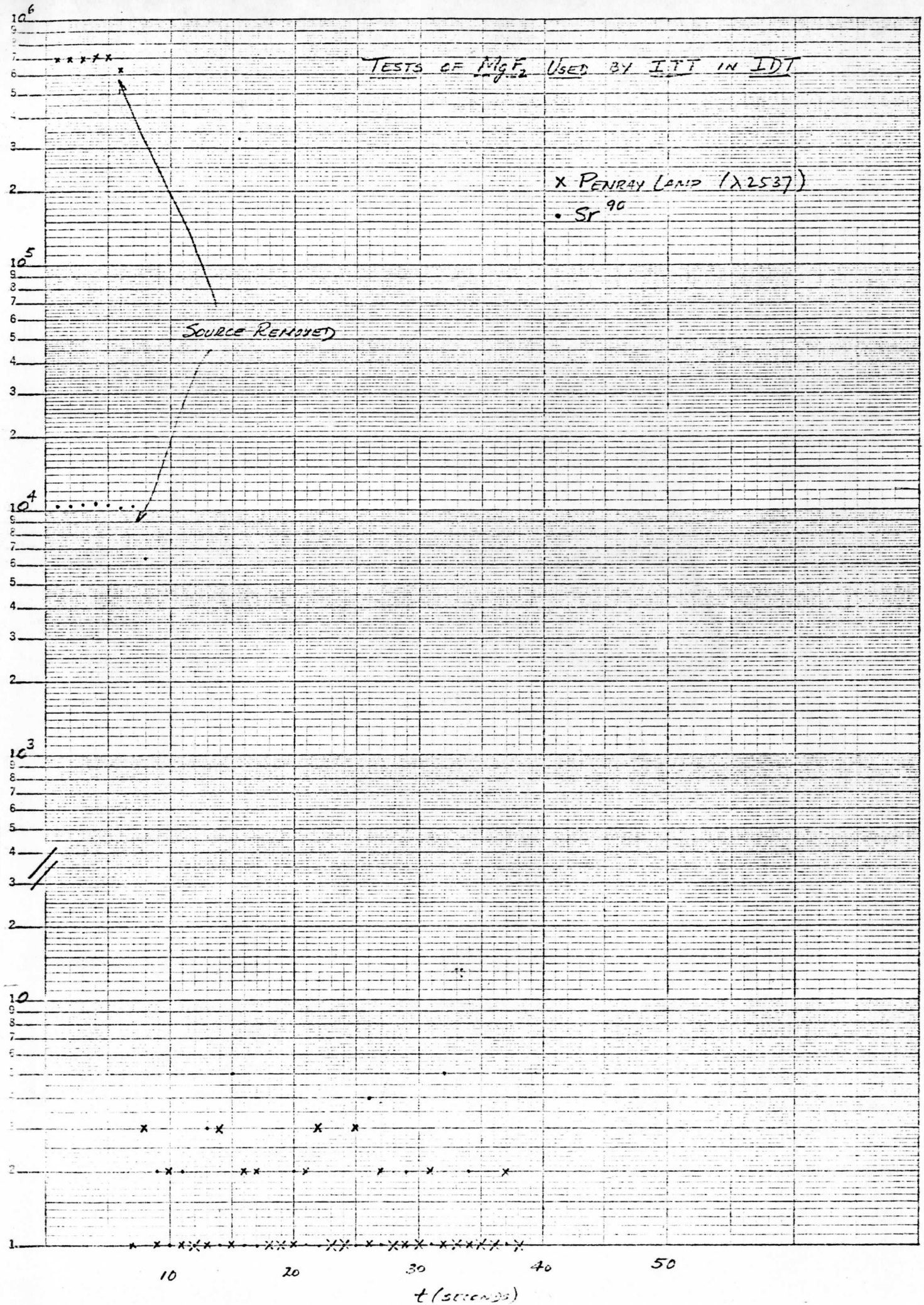
The radiation response of MgF window material (sample from ITT) has been tested and is not considered a problem. (See attached results).

E. Documentation Section

The instrument description (SE-01) outline was submitted in September. The document is now being written.

F. CCB Activity

STR-02 PSCN	Action
26	Received 9/24
STE-01 PSCN	
29	Received 9/24
OTA/SSM ICD PIRN	
2021	Received 9/25


TESTS OF MgF_2 USED BY ITT IN IDT
× PENRAY (AMD) (λ2537)
• Sr^{90}
SOURCE REMOVED
COUNTS/SEC
10^6
10^5
10^4
10^3
10
1
10
20
30
40
50
t (seconds)

ST/HSP SCHEDULE 10/8/79

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1	X	9-13	Box beam design complete		10-8	
2-1	X	10-11	Box beam machining compl.		10-15	
2-2	X	10-11	Box beam assy fixture compl.		10-12	
3-1	X	10-25	Box beam assy complete		11-1	Irridite
3-2		10-25	Electronics baseplate recd.			
4-1		11-8	EPB/Box beam assy complete			
4-2		11-8	Internal bulkheads received			
4-3		11-8	Forward bulkheads received			
4-4		11-8	Aft bulkheads received			
5-1		11-29	TSU bulkhead assy complete			
5-2		11-29	GSE hard pts/supports recd.			
6-1		12-3	TSU lower frame assy compl.			
6		12-3	Brackets/tubes/ODS structure received			
6-3		12-3	ODS conductor panel received			
7		12-22	TSU assembled			
8		1-9	TSU shipped to GSFC			
9		4-14	TSU tests complete--shipped to U.W.			
10		6-2	CDR Data Package submitted			
11		6-17	CDR			
12	X	9-20	Tooling/fixture design compl.	9-28		
13-1	XX	10-5	Main table support for all tooling		10-9	
13-2	XX	10-26	Fore and aft tooling(req.for EBP/box beam assembly)			
13-3	XX	11-9	Internal bulkhead assembly			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		8-31	Elec.baseplate design compl.	9-10		
15	X	9-20	Elec.baseplate (EPB) programming complete	10-5	10-5	
16		10-18	EPB machining complete			
17	X	9-20	Internal bulkhead design compl.	10-1		
18	X	10-4	Internal bulkhead programming complete		10-17	
19	X	10-18	Internal bulkhead machining complete		10-31	
20	X	10-4	Forward bulkhead design complete		10-12	Thermal input
21	X	10-18	Forward bulkhead programming complete		10-26	
22	X	11-1	Forward bulkhead machining complete		11-9	
23		10-18	Aft bulkhead design compl.			
24		10-25	Aft bulkhead programming complete			
25		11-8	Aft bulkhead machining complete			
26	X	9-13	Registration fitting support design complete		10-8	Thermal
27	X	10-25	Registration fitting support machining complete		11-8	
28	X	10-11	GSE hardpoint design compl.		10-12	
29		11-29	GSE hardpoint machining complete			
30	X	10-11	ODS subassy design complete		10-22	
31	X	11-15	ODS subassy machining compl.		12-3	
32	X	10-4	ODS conductor panel design complete		11-2	
33	X	11-8	ODS conductor panel fab.compl.		12-3	
34		11-25	Outer panel design complete			
35		12-22	Outer panel fab.complete			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
3		9-31	DEA box design complete	9-10		
37	X	10-11	DEA box machining complete		10-19	Analog box 2of7
38	X	9-13	PCDS TSU design complete	9-28		
39	X	10-4	PCDS TSU fab. complete		10-25	
40	X	10-4	System controller box design complete		10-12	
41		10-25	System controller box machining complete			
42		10-25	SDU box design complete			
43		11-1	SDU box machining compl.			
44		10-11	Preamp box design compl.	9-10		
45	X	11-1	Preamp box machining compl.		10-2	(2 of 7)
46		11-1	HVPS TSU design complete			
47		11-22	HVPS TSU fab. complete			
48	X	10-11	Handling fix/sling design complete		11-2	
49		11-22	Handling fix/sling fab. complete			
50		11-22	Shipping container design complete			
51		12-27	Shipping container manuf. complete			
52	X	9-21	PAD PWB assembled	9-7		
53		10-12	PAD PWB tested			
54-1		11-1	PAD PWB integrated in DEA			
54-2		11-1	CVC PWB " " "			
54-3		11-1	Deflection amp " " "			
55-1		12-11	DEA test complete			
5		12-11	Preamp integ.with DEA			
55-3		12-11	Dectector controller integ. with DEA			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
5		12-22	EM (Ø1) debugged			
57		2-19-80	EM (Ø1) tests complete			
58-1		3-6-80	PCDS,PMT integ. into EM			
58-2		3-6-80	IDT,HVPS integ. into EM			
59		4-31-80	EM (Ø2) tests complete			
60		7-17-80	EM detector controller, system controller integ.			
61		8-14-80	EM tests complete			
62		11-1-80	Flight MLB received			
63		12-4-80	Flight system controller assembly complete			
64	X	10-4	Preamp PWB assembled	9-27		
65		10-24	Preamp PWB tested			
66	X	9-27	CVC PWB assembled	9-14		
6		10-27	CVC PWB tested			
68	X	9-27	Deflect.Amp. PWB assembled	9-14		
69		10-23	Deflect.Amp. PWB tested			
70	X	10-3	Detector controller wire wrap debugged		10-17	
71		11-8	Det,ctller wire wrap tested			
72	X	11-21	Preamp box received		10-3	
73	X	12-6	Preamp assembled and tested			Will be accelerated
74		2-1	Detector controller MLB lay-out complete			
75		4-28	Detector controller MLB recd			
76		6-5	EM detector controller compl.			
77		7-7	EM detector controller test complete			
7	X	9-24	System controller wire wrap debugged		10-12	
79		11-8	System controller test compl.			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
8[illegible]		2-1	System controller MLB layout complete			
81		4-28	System controller MLB recd			
82		6-5	EM system controller compl.			
83		7-7	EM system controller test complete			
84		7-21	Flight PWB received			
85		10-9	Flight analog elec. assembly complete			
86-1		12-1	Flight analog elec. PWB test complete			
86-2		12-1	Flight detector controller assy compl.			
87		12-21	Flight DEA assembly complete			
8[illegible]		12-17	EM PCDS received			
89		1-21	EM PCDS test compl.			
90		12-17	EM HVPS received			
91		1-17	EM HVPS test compl.			
92		12-13	EM IDT received			
93-1		1-24	EM HVPS integ. with IDT			
93-2		1-24	EM IDT test complete			
94		2-20	EM IDT/HVPS test compl.			
95		12-6	EM PMT received			
96		1-19	EM PMT test complete			
97	X	8-31	RIU I/F design compl.	9-7		
98	X	9-13	RIU I/F fab. complete		10-17	Short parts
99	X	9-27	RIU I/F test complete		10-24	
100-1	X	10-18	RIU I/F installed in GSE		10-24	
100-2	X	10-18	DMA I/F installed in GSE		10-24	

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
100-3	X	10-18	Science I/F installed in GSE		10-24	
100-4	X	10-18	Parallel I/F installed in GSE		10-24	
100-5		10-18	GSE software complete			
101-1		11-7	GSE debug complete			
102-4	XX	11-7	PBS integrated		12-11	
102-1		12-11	GSE test complete			
102-2		12-11	TCB integrated			
102-3		12-11	Star Simulator integ.			
103	X	8-31	DMA I/F fab. compl.	9-19		
104	X	10-27	DMA I/F test compl.		10-12	
105	X	8-31	Science I/F fab.compl.	9-19		
1	X	9-27	Science I/F test compl.	10-8		
107	X	8-31	Parallel I/F fab.compl.	9-19		
108	X	9-27	Parallel I/F test compl.	10-8		
109	X	9-6	PBS design complete		10-24	
110	X	10-18	PBS fab. complete	11-28		
111	X	11-5	PBS test complete	12-10		
112		10-25	TCB design complete			
113	X	11-21	TCB fab. complete			
114		12-6	TCB test complete			
115	X	9-17	Star Simulator elec.design complete		10-31	
116	X	10-11	Star Simulator fab.compl.		11-21	
117	X	11-8	Star Simulator test compl.		12-10	
1		7-7-80	Mech.dwgs released for PFU machining			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
119		10-1-80	PFU machining complete			
120		1-8-81	PFU structure assy compl.			
121	X	9-20	SDU design complete		10-2	
122		10-10	SDU PWB layout compl.			
123		11-21	SDU PWB received			
124		12-13	SDU assembly and test complete			

SOFTWARE MILESTONES
(Near Term)

M'STONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
S1		9-25	GSE real time system debugged	10-2		
S2		9-17	Display system complete	10-2		
S3		9-24	Command system complete	TBD		
S4		12-20	HSP Data Base on line			
S5		11-8	Star Simulator module complete			
S6		10-10	Display system debugged			
S7		10-18	Command system debugged	TBD		
S8	XX	9-17	Transfer UT design to UW	9-28		
S9	XX	10-9	Non-science routines design complete			
S10	XX	11-12	Design of science routines complete			
	XX	12-3	Non-science routines coded			
S12	XX	12-18	Science mode routines coded			
S13	XX	11-5	Bus director routines designed			
S14	XX	12-13	Bus director routines coded			

1979 SEPTEMBER 20 27 | 3 10 17 24 | OCTOBER 1 8 15 22 29 | NOVEMBER 5 12 19 26 | DECEMBER 3 10 17 24 31 | 1980 JANUARY 7 14 21 28 | FEBRUARY 11 18 25 | MARCH 3 10 17 24 31 | APRIL 7 14 21 28 | 5 12

CATIONS / HOLIDAYS

REVIEWS / MEETINGS — IDT TEST · COMM AVWG · SWVG · AV REV

TSU — 1 BOX BEAM DESIGN · 2 MACHINE BOX BEAM · 3 ASSEMBLE BOX BEAM · 4 EPB/BOX BEAM ASST · 5 BULKHEAD ASST · 6 SLOWER STRUT ASST · 7 FINAL ASST · TSU CHECKOUT · 8 SHIP TO GSFC · TSU TEST @ GSFC · 9 SHIP TO UW

TOOLING/FIXTURES — DESIGN · 12 MAIN STRUT · 13 BB ASSY

ELECTRONICS BASE PLATE (EPB) — DESIGN · 14 PROGRAM · 15 MACHINE · 16 SHIP

BULKHEADS: INTERNAL — DESIGN · 17 PROGRAM · 18 MACHINE · 19 SHIP

FORWARD — DESIGN · 20 PROGRAM · 21 MACHINE · 22 SHIP

AFT — DESIGN · 23 PG · 24 MACH · 25

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CONDUCTOR PANEL — DESIGN · 32 FABRICATE · 33

PANELS — DESIGN · 34 FABRICATE · 35

ELECTRONICS BOXES (TSU/LM)

DEA (5/2) — 36 PROG/MACH · 37

PCDS (1/0) — DESIGN · 38 FAB · 39

CYSCON (1/1) — DESIGN · 40 FAB · 41

U (1/0) — DESIGN · 42 FAB · 43

PREAMP (5/2) — DESIGN · 44 PROG/MACH · 45

HVPS (5/0) — DESIGN · 46 PROG MACH · 47

HANDLING FIXTURE / SLING — DESIGN · 48 MANUFACTURE · 49

SHIPPING CONTAINER — DESIGN · 50 MANUFACTURE · 51

ENGINEERING MODEL / ELECTR

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PREAMP (2) — FAB · 64 TEST · 65 · 67

CVC (2) — FAB · 66 TEST · 67

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PCDS — TEST DEA · 72 · ASSEMBLE/TEST · 73 · 74 · DEBUG EM · 55 · 56 · SOFTWARE · INTERFACE · TEST EM (#1) · 57 INT PCDS, IDT, PMT · 58 · TEST EM (#2) · 59 · FAB

HVPS — LAYOUT MLB · 74 · LAYOUT MLB · 80 · FAB MLB · 75 BUILD · FAB MLB · 81 BUILD

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PMT

GSE

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DMA I/F — FAB · 103 TEST · 104

SCIENCE I/F — FAB · 105 TEST · 106

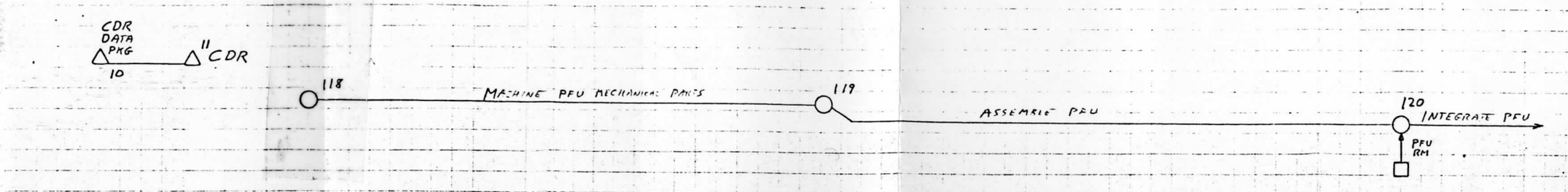
PARALLEL I/F — FAB · 107 TEST · 108 · SOFTWARE

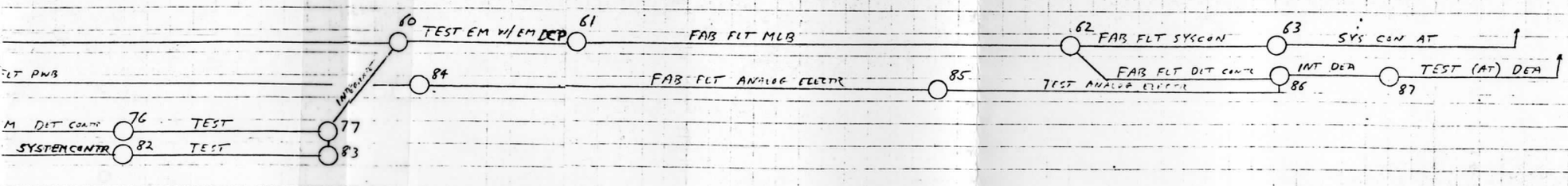
PBS — DESIGN · 109 FAB · 110 TEST · 111 · INT

SIMULATOR ELECTR — DESIGN · 112 FAB · 113 TEST · 114 · DESIGN · 115 FAB · 116 TEST · 117

□ C+D11 SIM #1

Y	JUNE					JULY			AUGUST				SEPTEMBER				OCTOBER				NOVEMBER				DECEMBER				1981 JANUARY			
19	26	2	9	16	23	30	7	14	21	28	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	29	5	12	19	26





C4011 SIM #2

EER REV 10/9/79
8-29-79 REV 9/11/79
129 CAFT TM-USFO

SEC/ space telescope Don Johnson

DR-MA-02 Number 19
Issued: 29 October 1979

Monthly Report

for

October 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W. Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

NOTE: This report covers the period 10-26 October 1979

A. Technical Section

The TSU fabrication effort is now well under way with the electronics baseplate, cap, preamp and DEA boxes, and PCDS TSU complete. Assembly and tooling fixture design and fabrication is also well along. Experience to date has shown that some previous estimates of assembly time were unrealistically low. Unanticipated minor problems have caused some tasks to take longer to complete than planned. Examples of the kind of problems encountered are out of specification flatness found on the main assembly fixture tooling plate and additional holes required to hold parts to the table during machining. While these are minor problems and are readily overcome, the schedule is adversely affected. We have therefore reviewed the TSU fabrication and assembly schedule to allow for time to overcome normal but unanticipated problems. This revised schedule is attached and shows TSU delivery to GSFC on February 16, 1980. The tooling and assembly fixtures account for a major portion of the change.

Changes in the thermal design have also accounted for some of the TSU schedule delay. Results from the detailed NASTRAN model have led to revisions in the forward and aft bulkhead design and a change in material for the outer panels. The radiator panels between the forward and aft bulkheads and the first internal bulkhead are now fiberglass with a low emissivity surface. This change reduces the heat lost from the forward and aft bulkheads and thereby conserves heater power required to maintain interface temperatures. Power consumption in the Hold mode is now 58 watts. Temperatures in the Cold Hold mode predicted by the latest model runs are:

Forward bulkhead, A and C fittings	-10.5°C to -13.8°C
Aft bulkhead and B fitting	-10.4°C to -14.4°C
Surface facing adjacent axial SI	-12.0°C to -18.0°C

Thermal analysis will continue in November with most effort on production of a reduced thermal model for delivery to LMSC.

Engineering model electronics assembly and test continued with few difficulties during the period. The PAD EMI shield fabrication was completed and tests were just begun. Enclosures were received and integration of the DEA analog electronics will occur in November. Debug of the system controller wirewrap boards is nearing completion and detailed testing is expected to begin shortly. The detector controller wire wrap board has been debugged and is now being tested. A request for quotation for the detector and system controller multilayer boards was sent out and a response is due by mid November.

The Image Dissector tube engineering model is now expected in late December. The first few tube starts were not successful but ITT now has a tube in burn-in, having passed an initial functional test.

The HVPS engineering model may be delayed somewhat due to some parts delivery problems. Lab supplies can be used to support tests of the IDT EM and HSP EM if required.

The process of issuing requisitions for flight parts is now just under way. Most flight parts are expected to be on order by November.

The quote for the Varian PMT was received and is unreasonably high. Alternative sources (non-US) will be investigated while negotiations continue with Varian. A flight configuration PMT is not required for HSP EM tests.

The newly revised GSE schedule appeared to be realistic in early October, but by the end of the month it was apparent that additional manpower would have to be applied to maintain the GSE completion date. The additional manpower has been applied, tasks reassigned, and a more detailed internal schedule written. The attached schedule reflects the major milestones of the detailed internal schedule. The additional manpower and revised task breakdown has preserved the schedule milestones required to support engineering model test activity.

Software effort remains on schedule.

A revised power budget is attached. The weight budget remains unchanged from the August report.

B. Schedule

A revised schedule is attached.

C. Problem Areas

The problems mentioned here last month are still with us. The Software Working Group and our C&DH simulator computer room schedule concerns have not diminished.

D. Science Section

The revised plan for the Mission Operations Working Group (ref: letter by Martin) has clarified the situation and should prove to be a sound basis for conducting the mission operations interface activities.

E. Documentation Section

No change.

F. CCB Activity

OTA/SSM ICD PIRN	Action
2021	Approved 10/8
2023	Approved 10/15
2024	Received 10/15
2025	Received 10/26
2026	Received 10/23
2027	Received 10/23
2028	Received 10/26
2029	Received 10/25

STE-05 CCR	Action
101	Approved 10/24

ST/HSP SCHEDULE 10/26/79

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		9-13	Box beam design complete	10-8	10-8	
2-1	X	10-11	Box beam machining compl.	10-18	10-18	
2-2	X	10-11	Box beam assy fixture compl.		11-3	
3-1	X	10-25	Box beam assy complete		11-17	
3-2	X	10-25	Electronics baseplate recd.	10-23		
4-1	X	11-8	EPB/Box beam assy complete		12-1	
4-2	X	11-8	Internal bulkheads received		11-13	
4-3	X	11-8	Forward bulkheads received		12-1	
4-4	X	11-8	Aft bulkheads received		12-1	
5-1	X	11-29	TSU bulkhead assy complete		12-22	
5-2	X	11-29	GSE hard pts/supports recd.		12-22	
6-1	X	12-3	TSU lower frame assy compl.		1-19-80	
6	X	12-3	Brackets/tubes/ODS structure received		12-13	
6-3	X	12-3	ODS conductor panel received		12-22	
7	X	12-22	TSU assembled		2-2-80	
8	X	1-9	TSU shipped to GSFC		2-16-80	
9	X	4-14	TSU tests complete--shipped to U.W.		5-21-80	
10		6-2	CDR Data Package submitted			
11		6-17	CDR			
12		9-20	Tooling/fixture design compl.	9-2[illegible]		
13-1		10-5	Main table support for all tooling	10-9	10-9	
13-2	X	10-26	Fore and aft tooling(req.for EBP/box beam assembly)		11-17	
13-3	X	11-9	Internal bulkhead assembly		12-8	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
14		8-31	Elec.baseplate design compl.	9-10		
15		9-20	Elec.baseplate (EPB) programming complete	10-5	10-5	
16	X	10-18	EPB machining complete	10-23		
17	X	9-20	Internal bulkhead design compl.	10-1		
18	X	10-4	Internal bulkhead programming complete		10-30	Hole location
19	X	10-18	Internal bulkhead machining complete		11-13	
20	X	10-4	Forward bulkhead design complete		11-3	Redesign thermal
21	X	10-18	Forward bulkhead programming complete		11-17	
22	X	11-1	Forward bulkhead machining complete		12-1	
23	X	10-18	Aft bulkhead design compl.		11-10	
24	X	10-25	Aft bulkhead programming complete		11-19	
25	X	11-8	Aft bulkhead machining complete		12-1	
26	X	9-13	Registration fitting support design complete	10-15	10-16	Thermal
27	X	10-25	Registration fitting support machining complete		11-17	
28	X	10-11	GSE hardpoint design compl.		11-17	
29	X	11-29	GSE hardpoint machining complete		12-22	
30	X	10-11	ODS subassy design complete		1-4-80	
31	X	11-15	ODS subassy machining compl.		1-17-80	
32	X	10-4	ODS conductor panel design complete		12-1	
3	X	11-8	ODS conductor panel fab.compl.		12-22	
34	X	11-25	Outer panel design complete		12-22	
35	X	12-22	Outer panel fab.complete		1-5-80	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
3		9-31	DEA box design complete	9-10		
37	X	10-11	DEA box machining complete	10-25	10-23	Analog box 2of7
38	X	9-13	PCDS TSU design complete	9-28		
39	X	10-4	PCDS TSU fab. complete	10-9	10-25	
40	X	10-4	System controller box design complete (TSU)		11-17	
41	X	10-25	System controller box machining complete (TSU)		11-29	
42	X	10-25	SDU box design complete		12-1	
43	X	11-1	SDU box machining compl.		12-13	
44		10-11	Preamp box design compl.	9-10		
45	X	11-1	Preamp box machining compl.	10-12	10-2	(2 of 7)
46	X	11-1	HVPS TSU design complete		12-8	
47	X	11-22	HVPS TSU fab. complete		12-22	
48	X	10-11	Handling fix/sling design complete		12-1	
49	X	11-22	Handling fix/sling fab. complete		12-22	
50	X	11-22	Shipping container design complete		12-22	
51	X	12-27	Shipping container manuf. complete		1-5-80	
52		9-21	PAD PWB assembled	9-7		
53	X	10-12	PAD PWB tested		10-29	
54-1		11-1	PAD PWB integrated in DEA			
54-2		11-1	CVC PWB " " "			
54-3		11-1	Deflection amp " " "			
55-1		12-11	DEA test complete			
5		12-11	Preamp integ.with DEA			
55-3		12-11	Dectector controller integ. with DEA			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
5		12-22	EM (Ø1) debugged			
57		2-19-80	EM (Ø1) tests complete			
58-1		3-6-80	PCDS,PMT integ. into EM			
58-2		3-6-80	IDT,HVPS integ. into EM			
59		4-31-80	EM (Ø2) tests complete			
60		7-17-80	EM detector controller, system controller integ.			
61		8-14-80	EM tests complete			
62		11-1-80	Flight MLB received			
63		12-4-80	Flight system controller assembly complete			
64	X	10-4	Preamp PWB assembled	9-27		
65	X	10-24	Preamp PWB tested		10-29	
66	X	9-27	CVC PWB assembled	9-14		
67	X	10-27	CVC PWB tested	10-8		
68	X	9-27	Deflect.Amp. PWB assembled	9-14		
69	X	10-23	Deflect.Amp. PWB tested	10-19		
70	X	10-3	Detector controller wire wrap debugged	10-12	10-17	
71		11-8	Det.ctller wire wrap tested			
72	X	11-21	Preamp box received	10-12	10-3	
73	X	12-6	Preamp assembled and tested			Will be accelerated
74		2-1	Detector controller MLB lay-out complete			
75		4-28	Detector controller MLB recd			
76		6-5	EM detector controller compl.			
77		7-7	EM detector controller test complete			
78	X	9-24	System controller wire wrap debugged		10-27	
79		11-8	System controller test compl.			

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
8		2-1	System controller MLB layout complete			
81		4-28	System controller MLB recd			
82		6-5	EM system controller compl.			
83		7-7	EM system controller test complete			
84		7-21	Flight PWB received			
85		10-9	Flight analog elec. assembly complete			
86-1		12-1	Flight analog elec. PWB test complete			
86-2		12-1	Flight detector controller assy compl.			
87		12-21	Flight DEA assembly complete			
8[illegible]		12-17	EM PCDS received			
89		1-21	EM PCDS test compl.			
90		12-17	EM HVPS received			
91		1-17	EM HVPS test compl.			
92		12-13	EM IDT received			
93-1		1-24	EM HVPS integ. with IDT			
93-2		1-24	EM IDT test complete			
94		2-20	EM IDT/HVPS test compl.			
95	X	12-6	EM PMT received		TBD	Negotiating
96		1-19	EM PMT test complete			
97	X	8-31	RIU I/F design compl.	9-7		
98	X	9-13	RIU I/F fab. complete		10-26	Short parts
99	X	9-27	RIU I/F test complete		11-19	
100-1	X	10-18	RIU I/F installed in GSE		11-26	
100-2	X	10-18	DMA I/F installed in GSE		11-26	

MSTONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
100-3	X	10-18	Science I/F installed in GSE		11-26	
100-4	X	10-18	Parallel I/F installed in GSE	10-17	10-24	
100-5	X	10-18	GSE software complete		11-22	
101-1	X X	11-7	DRCS test complete		11-28	
102-4	X	11-7	PBS integrated		12-7	
102-1	X	12-11	GSE test complete		12-7	
102-2	X	12-11	TCB integrated		12-7	
103	X	8-31	DMA I/F fab. compl.	9-19		
104	X	10-27	DMA I/F test compl.		11-20	
105		8-31	Science I/F fab.compl.	9-19		
106		9-27	Science I/F test compl.	10-8		
107		8-31	Parallel I/F fab.compl.	9-19		
108		9-27	Parallel I/F test compl.	10-8		
109	X	9-6	PBS design complete		11-5	
110	X	10-18	PBS fab. complete		11-22	
111	X	11-5	PBS test complete		12-4	
112	X	10-25	TCB design complete		11-6	
113	X	11-21	TCB fab. complete		11-13	
114	X	12-6	TCB test complete		11-21	
115	X	9-17	Star Simulator elec.design complete		11-9	
116	X	10-11	Star Simulator fab.compl.		12-26	
117	X	11-8	Star Simulator test compl.		1-14-80	
1		7-7-80	Mech.dwgs released for PFU machining			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
119		10-1-80	PFU machining complete			
120		1-8-81	PFU structure assy compl.			
121	X	9-20	SDU design complete	10-3	10-2	
122	X	10-10	SDU PWB layout compl.		11-10	
123		11-21	SDU PWB received			
124		12-13	SDU assembly and test complete			
125	XX	12-14	GSE Ø1 test complete (w/o Star Sim.)			

SOFTWARE MILESTONES
(Near Term)

M'STONE	NEW/CHANGE	SKD COMPL.	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
S1		9-25	GSE real time system debugged	10-2		
S2		9-17	Display system complete	10-2		
S3		9-24	Command system complete	10-8		
S4		12-20	HSP Data Base on line			
S5		11-8	Star Simulator module complete			
S6		10-10	Display system debugged	10-10		
S7		10-18	Command system debugged	TBD		
S8	XX	9-17	Transfer UT design to UW	9-28		
S9	XX	10-9	Non-science routines design complete	10-12		
S10	XX	11-12	Design of science routines complete			
S11	XX	12-3	Non-science routines coded			
S12	XX	12-18	Science mode routines coded			
S13	XX	11-5	Bus director routines designed			
S14	XX	12-13	Bus director routines coded			

1979 — SEPTEMBER 20 27 | 3 10 17 29 — OCTOBER 1 8 15 22 29 — NOVEMBER 5 12 19 26 — DECEMBER 3 10 17 24 31 — 1980 JANUARY 7 14 21 28 — FEBRUARY 4 11 18 25 — MARCH 3 10 17 24 31 — APRIL 7 14 21 28 — MAY 5 12 19 26 — JUNE 2 9 16

VACATIONS / HOLIDAYS

REVIEWS / MEETINGS

IDT TEST — CDR AVNG — SWVG — AV REV — CDR DATA PKG 10

TSU

TOOLING / FIXTURES

ELECTRONICS BASE PLATE (EPB)

BULKHEADS: INTERNAL
FORWARD
AFT

FITTINGS
REGISTRATION A+B
GSE

ODS
BRACKETS / TUBES / STRUCT
CONDUCTOR PANEL

PANELS

ELECTRONICS BOXES (TSU/EM)
DEA (5/2)
PCDS (1/0)
S[illegible] (1/1)
SDU (1/0)
PREAMP (5/2)
HVPS (5/0)

HANDLING FIXTURE / SLING
SHIPPING CONTAINER

ENGINEERING MODEL / ELECTR
PAD (2)
PREAMP (2)
CVC (2)
DETECTION AMPL (1)
DETECTOR CONTROLLER
SYSTEM CONTROLLER
SDU
PCDS
HVPS
IDT
PMT

GSE
RIU I/F
DMA I/F
SCIENCE I/F
PARALLEL I/F
PR[illegible]
T[illegible]
STAR SIMULATOR ELECTR

1 BOX BEAM DESIGN — 1 MACHINE BOX BEAM — 2 ASSEMBLE BOXBEAM — 3 EPB/BOXBEAM ASSY — 4 BULKHEAD ASSY — 5 LOWER FRAME ASSY — 6 FINAL ASSY — 7 TSU CHECKOUT — 8 TSU SHIP TO GSFC — TSU TEST @ GSFC — 9 SHIP TO UW

DESIGN — 12 MAIN SILL — 13 BB ASSY

DESIGN — 14 PROGRAM — 15 MACHINE — 16 SHIP

DESIGN — 17 PROGRAM — 18 MACHINE — 19 SHIP

DESIGN — 20 PROGRAM — 21 MACHINE — 22 SHIP

DESIGN — 23 PG — 24 MACHINE — 25 SHIP

DESIGN — 26 MACHINE — 27

DESIGN — 28 MACHINE (6) — 29

DESIGN — 30 MACHINE — 31

DESIGN — 32 FAB — 33

DESIGN — 34 FAB — 35

DESIGN — 36 PROG/MACH — 37

DESIGN — 38 FAB — 39

DESIGN — 40 FAB — 41

DESIGN — 42 FAB — 43

DESIGN — 44 PROG/MACH — 45

DESIGN — 46 PROG MACH — 47

DESIGN — 48 MANUFACTURE — 49

DESIGN — 50 MANUF — 51

FAB PWB — 52 TEST — 53 ASSEMBLE — 54 TEST DEA — 55 DEBUG EM — 56 TEST EM (01) — 57 INT PROS, IDT, PMT — 58 TEST EM (02) — 59 FAB FLT PWB

FAB — 69 TEST — 65

FAB — 66 TEST — 67

FAB — 68 TEST — 69

72 ASSEMBLE / TEST — 73 SOFTWARE — INTEGRATE

DEBUG HDW — 70 TEST — 71

DEBUG HDW — 78 TEST — 79 LAYOUT MLB — 79 — 80 FAB MLB — 75 BUILD EM DET CONTR — 76 — 81 BUILD EM SYSTEM CONTR — 82

DESIGN — 121 PWB LAYOUT — 122 FAB PWB — 123 ASSEMBLE / TEST — 124

88 RECEIVE + TEST PCBS — 89

90 TEST HVPS — 91

92 TEST IDT — 93 TEST IDT/HVPS — 94

95 TEST PMT — 96

DESIGN — 97 FAB — 98 DEBUG — 99 INT — 100 — 101 — INT

FAB — 103 TEST — 104

FAB — 105 TEST — 106

FAB — 107 TEST — 108

DESIGN — 109 FAB — 110 DEBUG — 111 TEST — 102 — 125

DESIGN — 112 FAB — 113 TEST — 114 INT

DESIGN — FAB + DEBUG — 115 — 116 TEST — 117

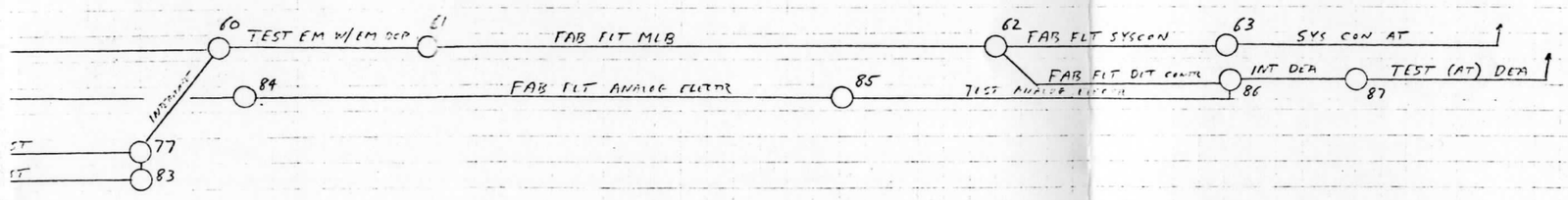
□ C1D11 SIM 01

1981

23	30	JULY 7	14	21	28	AUGUST 4	11	18	25	SEPTEMBER 1	8	15	22	29	OCTOBER 6	13	20	27	NOVEMBER 3	10	17	24	DECEMBER 1	8	15	22	29	JANUARY 5	12	19	26

CDR





☐ C-1011 SIM 92

EER REV 10/26/79
E-79-79 REV 10/8/79
REV 9/11/79
125

SSA/Div. 51
Don Johnson
file

DR-MA-02 Number 21
Issued: 9 January 1980

Monthly Report

for

December 1979

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The assembly of the TSU box beam was completed in December and attention was directed to the tooling and fixtures required to assemble the bulkheads, box beam, base plate, registration fittings, and GSE hardpoints. By the end of the reporting period the fixtures had been manufactured and were being checked and assembled. Some minor problems were encountered in assuring the accuracy of key points on the fixtures but these were all in the process of resolution at the end of the month. The forward bulkhead was received in December and the aft bulkhead is expected in early January having been delayed by a machine breakdown at the supplier's facility. The overall assembly plan was changed in December to incorporate a "pre-assembly" step during which all necessary holes are drilled, pieces fitted and clamped, and all fits are verified. After pre-assembly the parts are painted or coated then returned for final assembly. The change was made to allow for easier correction of problems and to perform the majority of the mechanical work prior to applying the final finishes. The plan now calls for the bulkhead pre-assembly to be complete by February 1.

Some difficulties were experienced in correlating the NASTRAN thermal model with the new reduced model. These problems were resolved by Chuck Wiggins who now has the reduced model running on a computer at GSFC.

A severe susceptibility of the current-to-voltage converter (CVC) to negative power line variations and noise was discovered in late December. The problem was fixed by the addition of a regulator for the CVC which is located near the pulse amplifier discriminator box (PAD). Another problem was discovered when combined PAD-CVC tests were begun. There was a ground loop created by the special test equipment which led to modification of the test equipment. These two problems have delayed the engineering model schedule by nearly two weeks.

The system controller also experienced difficulties in December when checkout of the combined redundant units was in progress. There were problems with the interconnection of the redundant halves which required some design modifications to correct. There were also some single point failure modes identified and removed by redesign. These problems have delayed the system controller tests and multilayer board design start to early January.

Delivery of the PCDS and IDT assembly engineering models is expected in late January or early February. A delivery date for the HVPS has not been established. The order for the engineering model PMT was placed in December.

Assembly and checkout of the GSE is proceeding on schedule and will be available to support engineering model tests. Testing of the RIU interface began in December using the EM RIU.

The power budget remains as previously reported. An updated weight budget is attached.

B. Schedule

The updated schedule is attached. The TSU delivery date is now March 17, as reported on December 20, but some near term engineering model milestones have slipped approximately two to four weeks for reasons noted in the technical section.

A new schedule will be drafted in January to more accurately represent the revised TSU assembly plan.

C. Problem Areas

The problems being monitored most closely are as follows:

1. Flight Parts

There have been difficulties in obtaining quotations on certain devices, particularly 54CS series IC's. Resolution of all flight parts quotation and promised delivery problems is expected in early January.

2. C&DH Computer Room

The cost and schedule of the room for the C&DH Simulator has become a real concern. Resolution of this issue is also expected in early January.

3. TSU Fabrication Schedule

Every reasonable attempt is now being made to maintain the present schedule through use of additional manpower and overtime.

D. Science Section

Because of the schedule changes since the last investigation definition team meeting, the meeting scheduled for January has been postponed.

E. Documentation Section

The A.O. Smith NASTRAN structural model report was transmitted to GSFC with the model in December.

F. CCB Activity

QTA/SSM ICD PIRN	Action
2032	Approved 12/7

Technical Direction	
0004	Approved 11/30
0005	Approved 12/11
0006	Approved 12/11

High Speed Photometer Weight Budget (1/9/80)

Reference: 1) HSP 9/10/79 Wgt Budget
2) Space Telescope Weight Control Plan

		Last Rept. Weight	Present Weight	Change	Design Maturity Code	% Required Contingency	Required Contingency Wgt
1.	Main Spar	45.7	44.9	-0.8	A	0	0
2.	Main Spar Stiffeners (6)	7.6	7.6	0.0	A	0	0
3.	Electronics Base Plate (EBP)	43.0	38.0	-5.0	A	0	0
4.	Main Spar/EBP Interface	4.3	4.3	0.0	CR	1	0.04
5.	Forward Bulkhead	41.9	44.5	+2.6	A	0	0
6.	Aft Bulkhead	30.4	29.0	-1.4	CR	1	0.29
7.	Interior Bulkheads (4 sets of 2)	29.7	32.4	+3.4	A	0	0
8.	Free Corner Bulkhead Ties	6.4	6.4	0.0	PR	3	0.19
9.	Outside Skin	61.3	61.3	0.0	CR	1	0.61
10.	Electrical Connector Plate	3.0	3.0	0.0	PR	3	0.09
11.	Forward Registration Fitting	6.2	6.8	+0.6	A	0	0
12.	Aft Registration Fitting	8.7	11.1	+2.4	A	0	0
13.	GSE Brackets (6)	20.0	17.5	-2.5	CR	1	0.18
14.	Crewman Handhold Brackets (4 sets)	15.0	15.0	0.0	PR	3	0.45
15.	Conductor Panels and Angles (2)	40.4	40.4	0.0	PR	3	1.20
16.	Longitudinal Fiberglass Angles (6)	7.6	7.6	0.0	PR	3	0.23
17.	Longitudinal Aluminum Angles (3)	2.5	2.5	0.0	PR	3	0.08
18.	Conductor Panel Bulkheads (6)	7.5	7.5	0.0	PR	3	0.23

		Last Rept. Weight	Present Weight	Change	Design Maturity Code	% Required Contingency	Required Contingency Wgt
19.	ODS Closeout Bulkheads (3)	5.0	5.0	0.0	PR	3	0.15
20.	Cable Harness	24.0	24.0	0.0	PR	8	1.90
21.	Fasteners and Brackets	10.0	10.0	0.0	E	18	1.80
22.	DEA's for IDT's and PMT (5)	40.0	38.0	-2.0	PR	8	3.04
23.	System Controller	15.0	15.0	0.0	PR	3	0.45
24.	PCDS	17.0	25.0	+8.0	PR	3	0.75
25.	SDU	6.0	3.0	-3.0	CL	13	0.39
26.	RIU (2) and EU (1)	13.0	11.7	-1.3	Spec	0	0.0
27.	Heaters and Paint	5.0	5.0	0.0	E	18	0.90
28.	ODS	65.0	70.0	+5.0	Spec/ CR/A	1	0.75
			586.5				13.72

Summary:

Launch Weight	600.00	Present Weight	586.50
Required Contingency	13.72	Present Contingency	13.50

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		9-13	Box beam design complete	10-8	10-8	
2-1	X	10-11	Box beam machining complete	10-18	10-18	
2-2	X	10-11	Box beam assembly fixture complete	11-5	11-5	
3-1	X	10-25	Box beam assembly complete	12-13	12-12	
3-2	X	10-25	Electronics baseplate received	10-23		
4-1	X	11-8	EBP/Box beam assembly complete		2-1	
4-2	X	11-8	Internal bulkheads received	11-28	11-13	
4-3	X	11-8	Forward bulkheads received	12-7	12-7	First piece scrapped
4-4	X	11-8	Aft bulkheads received		1-4	
5-1	X	11-29	TSU bulkhead assembly complete		2-1	
5-2	X	11-29	GSE hardpoints/supports received		1-11	
6-1	X	12-3	TSU lower frame assembly complete		2-15	
6-2	X	12-3	Brackets/tubes/ODS structure received		1-17	
6-3	X	12-3	ODS conductor panel received		1-18	
7	X	12-22	TSU assembled		2-29	
8	X	1-9-80	TSU shipped to GSFC		3-17	
9	X	4-14-80	TSU tests complete--shipped to UW		6-17	
10		6-2-80	CDR Data Package submitted		6-24	
11		6-17-8	CDR		7-8	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
12		9-20	Tooling/fixture design complete	9-28		
13-1		10-5	Main table support for all tooling	10-9	10-9	
13-2	X	10-26	Fore and aft tooling (req.for EBP/box beam assembly)	12-19	12-17	
13-3	X	11-9	Internal bulkhead assembly	12-8	12-8	
14		8-31	Elec.baseplate design complete	9-10		
15		9-20	Elec.baseplate (EBP) programming compl.	10-5	10-5	
16	X	10-18	EPB machining complete	10-23		
17	X	9-20	Internal bulkhead design complete	10-1		
18	X	10-4	Internal bulkhead programming complete	10-30	10-30	Hole location
19	X	10-18	Internal bulkhead machining complete	11-28	11-30	
20	X	10-4	Forward bulkhead design complete	11-5	11-5	Redesign thermal
21	X	10-18	Forward bulkhead programming complete	11-16	11-17	
22	X	11-1	Forward bulkhead machining complete	12-7	12-7	First piece scrapped
23	X	10-18	Aft bulkhead design complete	11-26	11-26	
24	X	10-25	Aft bulkhead programming complete	12-7	12-7	
25	X	11-8	Aft bulkhead machining complete		1-4	
26	X	9-13	Registration fitting support design complete	10-15	10-16	Thermal
27	X	10-25	Registration fitting support machining complete	11-23	11-23	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
28	X	10-11	GSE hardpoint design complete	12-18	12-19	
29	X	11-29	GSE hardpoint machining complete		1-11	
30	X	10-11	ODS subassembly design complete		1-11	
31	X	11-15	ODS subassembly machining complete		1-24	
32	X	10-4	ODS conductor panel design complete		1-16	
33	X	11-8	ODS conductor panel fab. complete		1-30	
34	X	11-25	Outer panel design complete		1-13	
35	X	12-22	Outer panel fabrication complete		1-27	
36		9-31	DEA box design complete	9-10		
37	X	10-11	DEA box machining complete	10-25	10-23	All received
38	X	9-13	PCDS TSU design complete	9-28		
39	X	10-4	PCDS TSU fabrication complete	10-9	10-25	
40	X	10-4	System Contrler box design compl. (TSU)	12-14	12-7	
41	X	10-25	Syst.Contrler box machining comp. (TSU)		1-9	
42	X	10-25	SDU box design complete	11-27	11-20	
43	X	11-1	SDU box machining complete	12-18	12-13	
44		10-11	Preamp box design complete	9-10		
45	X	11-1	Preamp box machining complete	10-12	10-2	All received
46	X	11-1	HVPS TSU design complete	12-6	12-7	
47	X	11-22	HVPS TSU fabrication complete	12-20	12-22	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
48	X	10-11	Handling fixture/sling design complete		1-17	
49	X	11-22	Handling fixture/sling fab. complete		1-26	
50	X	11-22	Shipping container design complete		2-1	
51	X	12-27	Shipping container manuf. complete		2-15	
52		9-21	PAD PWB assembled	9-7		
53	X	10-12	PAD PWB tested	10-29	10-29	
54-1		11-1	PAD PWB integrated in DEA	11-1		
54-2		11-1	CVC PWB integrated in DEA	11-1		
54-3		11-1	Deflection amp integrated in DEA	11-1		
55-1		12-1	DEA test complete		1-25	
55-2		12-11	Preamp integrated with DEA	12-1		
55-3		12-11	Detector controller integ. with DEA		1-17	
56		12-22	EM (Ø1) debugged		1-21	
57		2-19-80	EM (Ø1) tests complete			
58-1		3-6-80	PCDS,PMT integrated into EM			
58-2		3-6-80	IDT,HVPS integrated into EM			
59		4-31-80	EM (Ø2) tests complete			
60		7-17-80	EM detector controller, system controller integrated			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
61		8-14-80	EM tests complete			
62		11-1-80	Flight MLB received			
63		12-4-80	Flight system controller assem. compl.			
64	X	10-4	Preamp PWB assembled	9-27		
65	X	10-24	Preamp PWB tested	10-29	10-29	
66	X	9-27	CVC PWB assembled	9-14		
67	X	10-27	CVC PWB tested	10-8		
68	X	9-27	Deflection Amp.PWB assembled	9-14		
69	X	10-23	Deflection Amp.PWB tested	10-19		
70	X	10-3	Detector controller wire wrap debugged	10-12	10-17	
71		11-8	Detector controller wire wrap tested		2-1	
72	X	11-21	Preamp box received	10-12	10-3	
73	X	12-6	Preamp assembled and tested	11-1		
74		2-1-80	Detector controller MLB layout compl.		3-7	
75		4-28-80	Detector controller MLB received		4-18	
76		6-5-80	EM detector controller complete		5-9	
77		7-7-80	EM detector controller test complete		5-19	
78	X	9-24	System controller wire wrap debugged	10-26	10-27	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
79		11-8	System controller test complete		1-8	
80		2-1-80	System controller MLB layout complete		4-9	
81		4-28-80	System controller MLB received		5-21	
82		6-5-80	EM system controller complete		6-25	
83		7-7-80	EM system controller test complete		7-23	
84		7-21-80	Flight PWB received			
85		10-9	Flight analog elec.assembly complete			
86-1		12-1	Flight analog elec.PWB test complete			
86-2		12-1	Flight detector controller assem.compl.			
87		12-21	Flight DEA assembly complete			
88		12-17	EM PCDS received		2-1	
89		1-21-80	EM PCDS test complete		3-1	
90		12-17	EM HVPS received		TBD	
91		1-17-80	EM HVPS test complete		TBD	
92		12-13	EM IDT received		2-1	
93-1		1-24-80	EM HVPS integrated with IDT		TBD	
93-2		1-24-80	EM IDT test complete		2-19	
94		2-20-80	EM IDT/HVPS test complete			
95	X	12-6	EM PMT received		2-20	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
96		1-19-80	EM PMT test complete		3-20	
97	X	8-31	RIU I/F design complete	9-7		
98	X	9-13	RIU I/F fabrication complete	11-9	11-6	
99	X	9-27	RIU I/F test complete	12-10	12-6	Debug complete
100-1	X	10-18	RIU I/F installed in breadboard	12-12	12-7	
100-2	X	10-18	DMA I/F installed in breadboard	12-12	12-7	
100-3	X	10-18	Science I/F installed in breadboard	12-12	12-7	
100-4	X	10-18	Parallel I/F installed in GSE	10-17	10-24	
100-5	X	10-18	GSE software complete	10-8	12-5	Coded--need hard-ware for debug
101-1	XX	11-7	DRCS test with RIU complete		1-7	Design problem
102-2	X	12-11	TCB integrated and tested		1-25	
102-3		1-28-80	DRCS integrated and tested			
102-4	X	11-7	PBS integrated and tested		1-16	
103	X	8-31	DMA I/F fabrication complete	9-19		
104	X	10-27	DMA I/F test complete	12-10	12-5	
105		8-31	Science I/F fabrication complete	9-19		
106		9-27	Science I/F test complete	10-8		
107		8-31	Parallel I/F fabrication complete	9-19		
108		9-27	Parallel I/F test complete	10-8		

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
109	X	9-6	PBS design complete	11-5	11-5	
110	X	10-18	PBS fabrication complete	12-19	12-13	
111	X	11-5	PBS board test complete		12-21	
112	X	10-25	TCB design complete	11-7	11-7	
113	X	11-21	TCB fabrication complete	11-30	11-30	
114	X	12-6	TCB test complete	12-6	12-7	
115	X	9-17	Star Simulator elec.design complete	11-1	11-9	
116	X	10-11	Star Simulator fabrication complete		1-18	
117	X	11-8	Star Simulator test complete		1-25	
118		7-7-80	Mech dwgs released for PFU machining			
119		10-1-80	PFU machining complete			
120		1-8-80	PFU structure assembly complete			
121	X	9-20	SDU design complete	10-3	10-2	
122	X	10-10	SDU PWB layout complete	12-21	12-21	
123		11-21	SDU PWB received		1-10	
124		12-13	SDU assembly and test complete		TBR	Need potted xfmers
125	XX	12-14	GSE Ø1 test complete		2-8	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
S1		9-25	GSE real time system debugged	10-2		
S2		9-17	Display system complete	10-2		
S3		9-24	Command system complete	10-8		
S4		12-20	HSP Data Base on line		1-21	
S5		11-8	Star Simulator module complete		1-21	
S6		10-10	Display system debugged	10-10		
S7		10-18	Command system debugged	10-18		
S8	XX	9-17	Transfer UT design to UW	9-28		
S9	XX	10-9	Non-science routines design complete	10-12		
S10	XX	11-12	Design of science routines complete	11-19		
S11	XX	12-3	Non-science routines coded	12-14	12-17	
S12	XX	12-18	Science mode routines coded		1-14	
S13	XX	11-5	Bus director routines designed	11-9		
S14	XX	12-13	Bus director routines coded (input)	12-13		
S15	XX	1-14	Bus director command expander design			
S16		2-18	Bus director command expander coding			

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Don Johnson
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Space Science
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DR-MA-02 Number 22 v.2
Issued: 7 February 1980

Monthly Report

for

January 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The assembly fixtures which had been received in December were placed on the tooling plate and checked for proper dimensions. There were numerous difficulties in establishing the critical dimensions and getting various measurements to agree. A laser interferometer was used to resolve some of the problems. After the assembly fixtures were in place and verified, the TSU assembly was begun. The forward and aft bulkheads were placed on the fixtures and the box beam supports attached. The box beam was then attached to the bulkheads followed by the electronics base plate. Installation of the base plate involves numerous brackets and angles and fiberglass thermal isolation. At the end of the month the installation of the interior bulkheads had begun. It is expected that the remaining interior bulkheads will be installed by the end of the first week in February.

The ODS TSU (tubes, supporting brackets, mirror brackets, etc.) was completed in January and is now awaiting installation of heaters and painting. The machinist who was building the ODS TSU will now assist with TSU assembly.

The reduced thermal model was completed by Chuck Wiggins at GSFC and several case runs were made. At the end of the month the new model was sent to LMSC for inclusion in the next revision of the ST thermal model.

Testing of the engineering model analog electronics encountered some difficulties in January. After the CVC power line susceptibility problem was corrected and tests resumed, problems arose with the test equipment. The test boxes were not built using the same shielding, twisted pair, and grounding conventions used in the HSP wire harness design. When the test equipment was reworked to follow the HSP conventions the difficulties were corrected. Once the CVC tests were completed, testing began on the Focus Amplifier and were completed satisfactorily. Tests of the Deflection Amplifier were begun late in the month and were delayed by a problem in the current limit circuit which was modified since breadboard tests were completed. The problem has been corrected and testing is expected to be completed in early February. The second engineering model DEA analog section was started in January.

The system controller was reviewed in early January after engineering model tests were completed. As a result of the review, several minor changes were recommended, most of which were for reliability improvement, removal of single point failure modes, or for reduction of the number of parts. These changes have been incorporated and will be tested by early February. Documentation will then be reviewed and released for multilayer board design.

The detector controller temperature test has been delayed by the analog electronics and system controller delays. Tests will proceed in February using test equipment which has been built for testing image dissector tubes.

The engineering model image dissector tube tests were delayed by a corona problem which required some disassembly to repair. Tests will be completed, a critical design review held, and the unit delivered on February 26.

The engineering model PMT has been received and tests will begin in February.

The PCDS design review will be held on February 21 at Collins Radio. The date was slipped because of conflicts with other ST activities; the tests will be completed and the unit prepared for delivery in early February.

A review of the HVPS schedule and status was held at Velonex on January 31. Because of parts procurement problem, the engineering model delivery is now scheduled for April. Flight units will be delivered in October as previously planned.

At the end of January not all flight parts had been ordered. Quotations for Siliconix FET's and Motorola 54LS parts have not been received in spite of efforts since late October. These parts are expected to be on order by early in February. All other parts have been ordered and most delivery quotations are well within our requirements for flight unit fabrication. The exceptions are TI 54LS and RCA CMOS which are both quoted as fourth quarter 1980. The most severe impact of this late delivery is the inability to build and test an engineering model multilayer board prior to flight multilayer board fabrication. Second and third sources are being procured, but the industry situation with respect to low power Schottky and CMOS devices is extreme with most suppliers refusing to take further orders or to promise delivery anytime in 1980. Project assistance may be necessary to help with this problem.

GSE work continues on schedule. The power bus simulator was completed in mid January. The data receiver/command simulator is complete but not yet packaged. The GSE is being used to test the system controller and has been interfaced to the engineering model RIU. Effort is underway to review and revise documentation, fabricate necessary cables, and begin building the second unit.

Software work is progressing on schedule. The system controller bus director software design has begun, the double density disc for the GSE is now operational, and other GSE and 8080 software is progressing.

The University gave the Physical Plant a priority on the work needed to remodel the space required for the C&DH simulator and to complete by April 1. Work has begun.

The power and weight budgets are unchanged. The center of gravity and moment of inertia summary is attached.

B. Schedule

A revised TSU schedule is attached along with a new schedule for major events up to the start of VAP. The near term schedule which has been included for several months is nearly completed and is becoming obsolete because of changes in fabrication plan. It is attached to this report for the final time this month.

A new schedule is being prepared but parts delivery uncertainty prevents a detailed flight unit electronics production schedule from being made at this time.

The TSU delivery to GSFC is still planned for 3/17/80.

C. Problem Areas

The problems of greatest concern are as follows:

1. Flight Parts

Deliveries of 54LS and CMOS are presently quoted as fourth quarter 1980.

2. C&DH Simulator Computer Room

The build schedule is being monitored closely to assure completion by April 1.

D. Science Section

The test plan for the EM IDT assembly and PMT are being reviewed. Tests will begin in February.

E. Documentation Section

A revised thermal model was sent to LMSC in January.

F. CCB Activity

Technical Directions	Action
007	Approved 1/7
008	Approved 1/28

SI-OTA/SSM ICD PIRNs

2032	Approved at IFWG 1/29
2034	" "
2035	" "
2036	" "
2037	" "
2038	" "
2039	" "

HSP MASS PROPERTIES SUMMARY

2/1/80

Total Weight 586.5 lbs

Centers of Gravity (SI P coordinate system)

P1 = -39.45

P2 = +10.86

P3 = +10.62

Mass Moments of Inertia (about HSP c.g.) (lbs) x (s^2)/in.

IP11 = 312.17

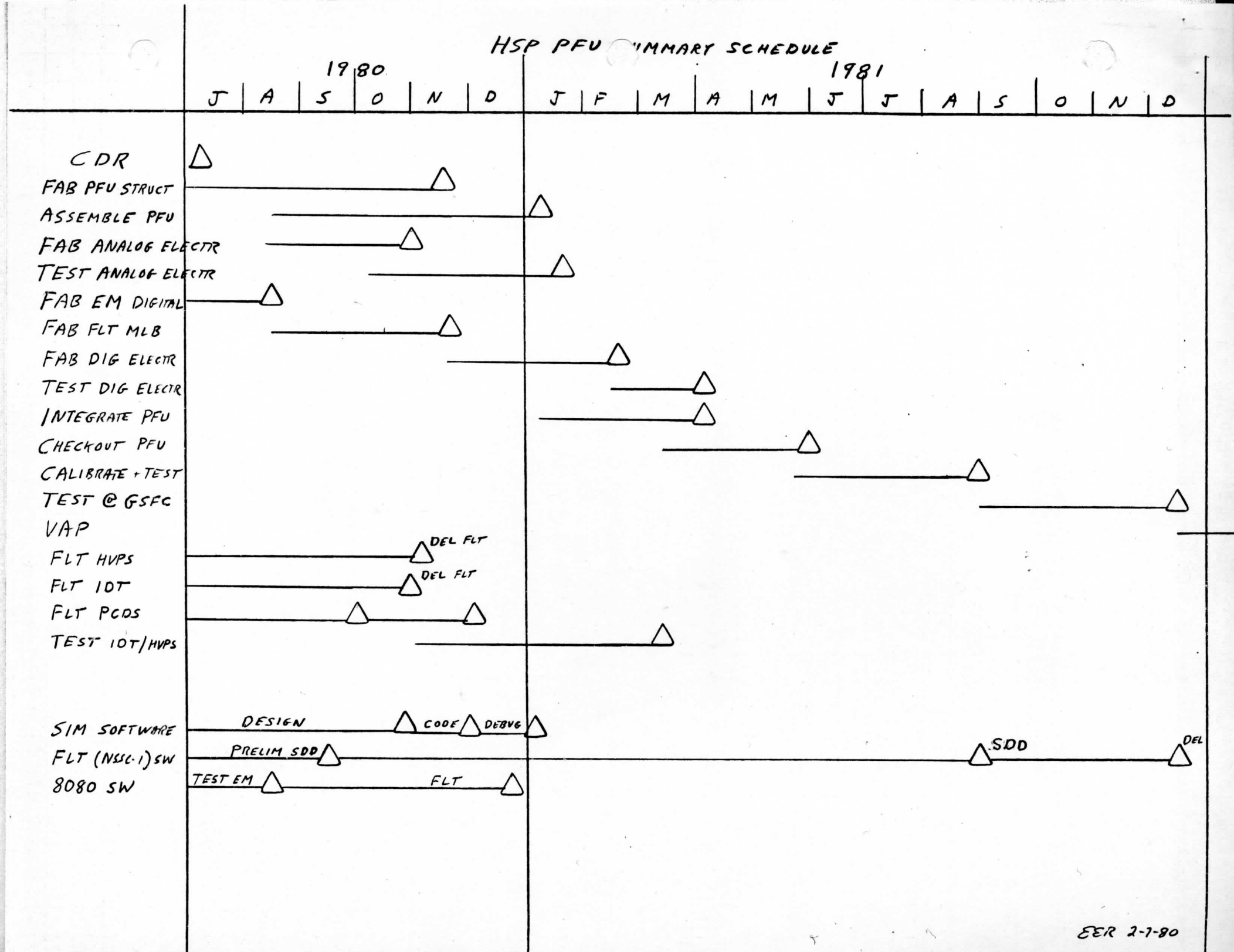
IP22 = 1187.85

IP33 = 1191.95

IP12 = 22.61

IP13 = 20.81

IP23 = 34.24


HSP PFU SUMMARY SCHEDULE
1980
1981
J A S O N D J F M A M J J A S O N D
CDR
FAB PFU STRUCT
ASSEMBLE PFU
FAB ANALOG ELECTR
TEST ANALOG ELECTR
FAB EM DIGITAL
FAB FLT MLB
FAB DIG ELECTR
TEST DIG ELECTR
INTEGRATE PFU
CHECKOUT PFU
CALIBRATE + TEST
TEST @ GSFC
VAP
FLT HVPS
DEL FLT
FLT IOT
DEL FLT
FLT PCDS
TEST IOT/HVPS
SIM SOFTWARE
DESIGN
CODE
DEBUG
FLT (NSSC-1) SW
PRELIM SDD
SDD
DEL
8080 SW
TEST EM
FLT
EER 2-7-80

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		9-13	Box beam design complete	10-8	10-8	
2-1	X	10-11	Box beam machining complete	10-18	10-18	
2-2	X	10-11	Box beam assembly fixture complete	11-5	11-5	
3-1	X	10-25	Box beam assembly complete	12-13	12-12	
3-2	X	10-25	Electronics baseplate received	10-23		
4-1	X	11-8	EBP/Box beam assembly complete	2-1	2-1	
4-2	X	11-8	Internal bulkheads received	11-28	11-13	
4-3	X	11-8	Forward bulkheads received	12-7	12-7	
4-4	X	11-8	Aft bulkheads received	1-14	1-4	
5-1	X	11-29	TSU bulkhead assembly complete		2-8	
5-2	X	11-29	GSE hardpoints/supports received	1-11	1-11	
6-1	X	12-3	TSU lower frame assembly complete		2-15	
6-2	X	12-3	Brackets/tubes/ODS structure received	2-1	1-30	
6-3	X	12-3	ODS conductor panel received		2-13	Higher priority work
7	X	12-22	TSU assembled		2-27	
8	X	1-9-80	TSU shipped to GSFC		3-17	
9	X	4-14-80	TSU tests complete--shipped to UW		6-17	
10		6-2-80	CDR Data Package submitted		6-24	
11		6-17-8	CDR		7-8	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
12		9-20	Tooling/fixture design complete	9-28		
13-1		10-5	Main table support for all tooling	10-9	10-9	
13-2	X	10-26	Fore and aft tooling (req.for EBP/box beam assembly)	12-19	12-17	
13-3	X	11-9	Internal bulkhead assembly	12-8	12-8	
14		8-31	Elec.baseplate design complete	9-10		
15		9-20	Elec.baseplate (EBP) programming compl.	10-5	10-5	
16	X	10-18	EPB machining complete	10-23		
17	X	9-20	Internal bulkhead design complete	10-1		
18	X	10-4	Internal bulkhead programming complete	10-30	10-30	
19	X	10-18	Internal bulkhead machining complete	11-28	11-30	
20	X	10-4	Forward bulkhead design complete	11-5	11-5	
21	X	10-18	Forward bulkhead programming complete	11-16	11-17	
22	X	11-1	Forward bulkhead machining complete	12-7	12-7	
23	X	10-18	Aft bulkhead design complete	11-26	11-26	
24	X	10-25	Aft bulkhead programming complete	12-7	12-7	
25	X	11-8	Aft bulkhead machining complete	1-14	1-4	
26	X	9-13	Registration fitting support design complete	10-15	10-16	
27	X	10-25	Registration fitting support machining complete	11-23	11-23	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
28	X	10-11	GSE hardpoint design complete	12-18	12-19	
29	X	11-29	GSE hardpoint machining complete	1-11	1-11	
30	X	10-11	ODS subassembly design complete	1-18	1-11	
31	X	11-15	ODS subassembly machining complete	2-1	2-1	
32	X	10-4	ODS conductor panel design complete	1-10	1-16	
33	X	11-8	ODS conductor panel fab. complete		2-13	
34	X	11-25	Outer panel design complete	1-11	1-13	
35	X	12-22	Outer panel fabrication complete		2-29	Will fit chk templates
36		9-31	DEA box design complete	9-10		
37	X	10-11	DEA box machining complete	10-25	10-23	All received
38	X	9-13	PCDS TSU design complete	9-28		
39	X	10-4	PCDS TSU fabrication complete	10-9	10-25	
40	X	10-4	System Contrler box design compl. (TSU)	12-14	12-7	
41	X	10-25	Syst.Contrler box machining comp. (TSU)	1-25	1-18	1st box scrapped
42	X	10-25	SDU box design complete	11-27	11-20	
43	X	11-1	SDU box machining complete	12-18	12-13	
44		10-11	Preamp box design complete	9-10		
45	X	11-1	Preamp box machining complete	10-12	10-2	All received
46	X	11-1	HVPS TSU design complete	12-6	12-7	
47	X	11-22	HVPS TSU fabrication complete	12-20	12-22	

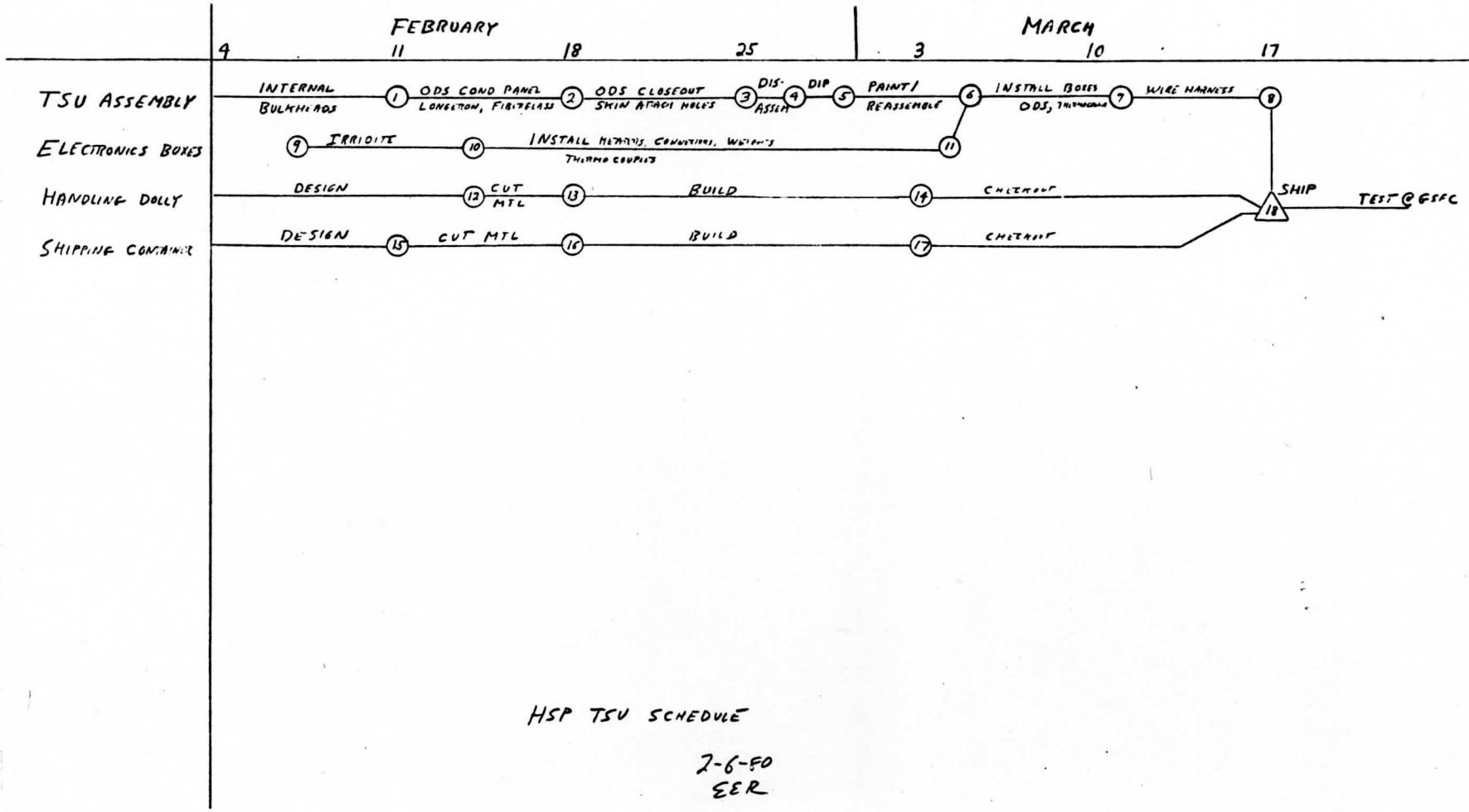
MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
48	X	10-11	Handling fixture/sling design complete	2-5	2-4	
49	X	11-22	Handling fixture/sling fab. complete		3-1	
50	X	11-22	Shipping container design complete		2-11	
51	X	12-27	Shipping container manuf. complete		3-1	
52		9-21	PAD PWB assembled	9-7		
53	X	10-12	PAD PWB tested	10-29	10-29	
54-1		11-1	PAD PWB integrated in DEA	11-1		
54-2		11-1	CVC PWB integrated in DEA	11-1		
54-3		11-1	Deflection amp integrated in DEA	11-1		
55-1		12-1	DEA test complete		2-7	DA current limit
55-2		12-11	Preamp integrated with DEA	12-1		
55-3		12-11	Detector controller integ. with DEA		TBD	Det.Ctrlr to test sep.
56		12-22	EM (Ø1) debugged		2-11	
57		2-19-80	EM (Ø1) tests complete			
58-1		3-6-80	PCDS,PMT integrated into EM			
58-2		3-6-80	IDT,HVPS integrated into EM			
59		4-31-80	EM (Ø2) tests complete			
60		7-17-80	EM detector controller, system controller integrated			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
61		8-14-80	EM tests complete			
62		11-1-80	Flight MLB received			
63		12-4-80	Flight system controller assem. compl.			
64	X	10-4	Preamp PWB assembled	9-27		
65	X	10-24	Preamp PWB tested	10-29	10-29	
66	X	9-27	CVC PWB assembled	9-14		
67	X	10-27	CVC PWB tested	10-8		
68	X	9-27	Deflection Amp.PWB assembled	9-14		
69	X	10-23	Deflection Amp.PWB tested	10-19		
70	X	10-3	Detector controller wire wrap debugged	10-12	10-17	
71		11-8	Detector controller wire wrap tested		2-15	
72	X	11-21	Preamp box received	10-12	10-3	
73	X	12-6	Preamp assembled and tested	11-1		
74		2-1-80	Detector controller MLB layout compl.		4-1	
75		4-28-80	Detector controller MLB received		7-1	
76		6-5-80	EM detector controller complete		TBD	Parts
77		7-7-80	EM detector controller test complete		TBD	Parts
78	X	9-24	System controller wire wrap debugged	10-26	10-27	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
79		11-8	System controller test complete	1-10	1-8	
80		2-1-80	System controller MLB layout complete		5-9	
81		4-28-80	System controller MLB received		6-21	
82		6-5-80	EM system controller complete		TBD	Parts
83		7-7-80	EM system controller test complete		7-23	
84		7-21-80	Flight PWB received			
85		10-9	Flight analog elec.assembly complete			
86-1		12-1	Flight analog elec.PWB test complete			
86-2		12-1	Flight detector controller assem.compl.			
87		12-21	Flight DEA assembly complete			
88		12-17	EM PCDS received		2-21	
89		1-21-80	EM PCDS test complete		3-1	
90		12-17	EM HVPS received		4-30	
91		1-17-80	EM HVPS test complete		5-30	
92		12-13	EM IDT received		2-26	Corona problem
93-1		1-24-80	EM HVPS integrated with IDT		6-5	
93-2		1-24-80	EM IDT test complete		4-8	
94		2-20-80	EM IDT/HVPS test complete		7-1	
95	X	12-6	EM PMT received	2-4	2-20	

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
96		1-19-80	EM PMT test complete		3-20	
97	X	8-31	RIU I/F design complete	9-7		
98	X	9-13	RIU I/F fabrication complete	11-9	11-6	
99	X	9-27	RIU I/F test complete	12-10	12-6	Debug complete
100-1	X	10-18	RIU I/F installed in breadboard	12-12	12-7	
100-2	X	10-18	DMA I/F installed in breadboard	12-12	12-7	
100-3	X	10-18	Science I/F installed in breadboard	12-12	12-7	
100-4	X	10-18	Parallel I/F installed in GSE	10-17	10-24	
100-5	X	10-18	GSE software complete	10-8	12-5	Coded--need hard-ware for debug
101-1	XX	11-7	DRCS test with RIU complete	1-11	1-7	Design problem
102-2	X	12-11	TCB integrated and tested		1-25	
102-3		1-28-80	DRCS integrated and tested	2-4	2-4	
102-4	X	11-7	PBS integrated and tested	1-25	1-16	
103	X	8-31	DMA I/F fabrication complete	9-19		
104	X	10-27	DMA I/F test complete	12-10	12-5	
105		8-31	Science I/F fabrication complete	9-19		
106		9-27	Science I/F test complete	10-8		
107		8-31	Parallel I/F fabrication complete	9-19		
108		9-27	Parallel I/F test complete	10-8		

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
109	X	9-6	PBS design complete	11-5	11-5	
110	X	10-18	PBS fabrication complete	12-19	12-13	
111	X	11-5	PBS board test complete	1-14	12-21	
112	X	10-25	TCB design complete	11-7	11-7	
113	X	11-21	TCB fabrication complete	11-30	11-30	
114		12-6	TCB test complete	12-6	12-7	
115	X	9-17	Star Simulator elec.design complete	11-1	11-9	
116	X	10-11	Star Simulator fabrication complete		TBD	
117	X	11-8	Star Simulator test complete		TBD	
118		7-7-80	Mech dwgs released for PFU machining			
119		10-1-80	PFU machining complete			
120		1-8-80	PFU structure assembly complete			
121	X	9-20	SDU design complete	10-3	10-2	
122	X	10-10	SDU PWB layout complete	12-21	12-21	
123		11-21	SDU PWB received	1-15	1-10	
124		12-13	SDU assembly and test complete		TBR	Need potted xfmers
125	XX	12-14	GSE Ø1 test complete		2-8	



HSP TSU SCHEDULE

2-6-70
EER

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		2-11	Internal bulkheads assembled			
2		2-18	ODS conductor panel, longerons, fiber-glass installed			
3		2-25	ODS closeout installed, skin attach holes drilled			
4		2-27	TSU disassembled			
5		2-29	TSU parts dipped			
6		3-5	Structure painted and reassembled			
7		3-11	Electronic box TSU's,thermocouples,ODS installed			
8		3-17	Wire harness installed			
9		2-7	Box TSU's drilled			
10		2-14	Box TSU's irridited			
11		3-4	Box TSU's painted, wired, assembled			
12		2-14	Dolly design complete			
13		2-18	Dolly material cut			
14		3-3	Dolly fabrication complete			
15		2-11	Shipping container design complete			
16		2-18	Shipping container material cut			
17		3-3	Shipping container fabrication complete			
18		3-17	TSU shipped to GSFC			

Don Johnson

DR-MA-02 Number 23
Issued: March 6, 1980

Monthly Report

for

February 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The preliminary assembly of the TSU was nearly completed in February. The work proceeded at a faster pace than in previous months now that the major tooling and tolerance difficulties have been overcome. By the end of the month the internal bulkheads, longerons, many of the fiberglass pieces, GSE hardpoints, and EVA crew aid interfaces had been assembled. During the month it was determined that the low emissivity surfaces would be bare aluminum instead of R-5. The untreated aluminum has equal thermal properties and is sufficiently stable for TSU test purposes. Elimination of the R-5 treatment saves considerable disassembly time. It was also determined that heaters, thermocouples, and wiring needed only for TSU thermal vacuum tests would be installed at GSFC by UW personnel just prior to thermal vacuum testing. The impact on the test schedule is minor since some thermal vacuum preparations would be required in any case. This plan prevents heater deliveries from impacting the TSU ship date and allows additional time to analyze the present heater placement and modify if necessary. Disassembly for bulkhead painting and final hole treatment is scheduled for early March.

The TSU handling dolly, sling, and shipping container design was completed in February, material received, and assembly begun. Completion of this effort is expected by early March.

Testing of engineering model analog subsystems was completed in February. Design modifications necessary to correct the deflection amplifier current limit problem have been tested and are now being incorporated into the documentation. A new layout for the deflection amplifier PWB will be completed in March.

System controller tests have been completed and documentation is being revised in preparation for start of multilayer board design in March. The detector controller temperature test is now planned for March. The Space Astronomy Lab Modcomp computer will be used to test image dissector tubes using engineering model electronics. This test configuration is also suitable for testing the detector controller. The detector controller test will therefore serve as an operational readiness test for the engineering model image dissector assembly test equipment.

The construction of the second set of engineering model detector electronics has begun. The second set will be used on the HSP engineering model, the wire harness for which is being built.

A critical design review for the PCDS was held at Rockwell-Collins in Cedar Rapids on February 21. The most serious difficulty is that the PCDS weight which was specified to be 25 lbs, is now 35 lbs. The increase was not the result of any one cause but a combination of factors including general underestimating of subassembly chassis weight,

wire harness, and recent design modifications. Thermal testing of the PCDS demonstrated the need to increase the conductivity between certain current boards and the chassis. This was done by adding a sheet of rubber between the board and the chassis. Several weight reduction measures were considered and those which do not compromise other design objectives significantly were adopted. These changes will reduce weight 2 to 2.5 lbs. The flight unit weight is therefore expected to be not more than 33 lbs. There were a few other minor out of specification conditions which are now being investigated further. Delivery of the engineering model PCDS is expected after completion of some further tests at Collins in mid to late March.

A critical design review was also held at ITT in Fort Wayne for the Image Dissector Assembly. The engineering model tests were complete and there are no problems. The overall performance exceeds the specification. The dark count is about 0.3/sec compared to the specification limit of 25/sec. ITT has reasonable hope that flight tubes will have similar dark count values since they attribute this specification conservatism to experience with less controlled test conditions. If flight tubes have similar dark count, overall HSP sensitivity will be increased.

Tests of the engineering model PMT continued in February and results are so far satisfactory. Packaging design will begin after TSU delivery.

The first set of GSE is nearly complete with only a few cables to be made. Construction of the second set is proceeding and is due to be complete in May.

The thermal model runs required for input to the NASTRAN structural model for determination of thermal deformations were completed in February. The structural runs will be completed in early March. The results will then show the deflection of optical elements due to thermal transients.

Sources for most flight parts have been found and the number of late deliveries has been reduced from about 30 line items to less than five. Further efforts will be made in March.

The work on the C&DH simulator room is progressing on schedule and should be complete by April 1.

Revised power and weight budgets are attached.

B. Schedule

On March 4 GSFC directed TSU shipment be delayed one week to March 24. The TSU schedule milestone update is attached. The major uncertainty in the TSU schedule is the time required to reassemble after painting. The worst case estimates differ by as much as a week from the presently scheduled ship date. Every effort is being expended to meet the March 24 ship date.

A revised PFU schedule is also attached. The milestones requested

by the GSFC STSOP are shown.

C. Problem Areas

Significant progress has been made on both problems reported last month. There are no major problems at this time.

D. Science Section

The optical design for the PMT will be the subject of increased attention in the next several weeks. Detailed tests of the engineering model image dissector assembly will also be carried out.

E. Documentation Section

The major current activity is on flight unit design documentation, GSE documentation and planning for CDR submittals.

F. CCB Activity

Technical Directions	Action
HSP-008 (Pwr Audit)	Approved
C&DH ICD PIRNs	
001	Received 2/4
003-012	Received 2/4

ORBITAL CONDITION	OPERATE	HOLD
PEAK POWER	168.1	90.6
HOT	105.9	TBD
COLD	140.8	63.4

NOTES: 1) All above values based on 10W allocation for RIU. Calculated RIU power (from SI-SI C&DH ICD) is 4.1W.

2) Values given indicate typical operating and hold cases. These may vary significantly with environment and planned operations.

HSP MONTHLY POWER SUMMARY

ITEM	COLD CONDITION	COMMENTS
current power usage	140.8	
% estimated	31.9	
% calculated	68.1	
% measured	0	
power usage contingency	6.1%	Contingency based on 150W HSP operate power.
*pending changes	(1) -5.0	
*potential changes	0	
projected power usage	135.8	

*Identify items: (1) RIU allocation to be reduced to 5.0W from present 10.0W per Levin letter dated 2/13/80.

HSP POWER USAGE REPORT (WATTS) for February (Month), 1980 (Year)

HSP POWER BUDGET 3- 7-80

OPTICAL DETECTOR SUBSYSTEM (ODS)

	MINIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	POWER SOURCE	SEC•DC POWER	SEC•DC TOTAL	COMP• DISSIP•	NO. OF UNITS	SEC•DC POWER	SEC•DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	1935.	1935.	1852.	5	9673.	9673.	9260.
IDT ASSEMBLY								
DIVIDER		0.	0.	82.	4	0.	0.	330.
FOCUS COIL		0.	0.	937.	4	0.	0.	3748.
HORIZ DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
VERT DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
PAC PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL IDT ASSEMBLY		127.	127.	1147.		510.	510.	4588.
PMT ASSEMBLY								
DIVIDER		0.	0.	82.	1	0.	0.	82.
PAC PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	210.		127.	127.	210.

MINIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 14058.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	9673.
IDT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	9673.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC•DC POWER	SEC•DC TOTAL	COMP• DISSIP•	NO• OF UNITS	SEC•DC POWER	SEC•DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	2026•	2026•	1866•	5	10129•	10129•	9329•
IDT ASSEMBLY								
DIVIDER		0•	0•	160•	4	0•	0•	640•
FOCUS COIL		0•	0•	1177•	4	0•	0•	4708•
HORIZ DEFLECTION COIL		0•	0•	17•	4	0•	0•	68•
VERT DEFLECTION COIL		0•	0•	20•	4	0•	0•	80•
PAD PREAMP	P15T	60•	127•	127•	4	240•	510•	510•
	M15T	67•				270•		
TOTAL IDT ASSEMBLY		127•	127•	1501•		510•	510•	6006•
PMT ASSEMBLY								
DIVIDER		0•	0•	160•	1	0•	0•	160•
PAD PREAMP	P15T	60•	127•	127•	1	60•	127•	127•
	M15T	67•				67•		
TOTAL PMT ASSEMBLY		127•	127•	287•		127•	127•	287•

NOMINAL TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 15622•

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0•	0•	0•	0•	0•	0•	10129•
IDT ASSEMBLY	240•	270•	0•	0•	0•	0•	0•
PMT ASSEMBLY	60•	67•	0•	0•	0•	0•	0•
ODS TOTAL	300•	337•	0•	0•	0•	0•	10129•

MAXIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	2146.	2146.	1884.	5	10732.	10732.	9419.
IDT ASSEMBLY								
DIVIDER		0.	0.	262.	4	0.	0.	1050.
FOCUS COIL		0.	0.	1665.	4	0.	0.	6660.
HORIZ DEFLECTION COIL		0.	0.	69.	4	0.	0.	276.
VERT DEFLECTION COIL		0.	0.	81.	4	0.	0.	324.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL IDT ASSEMBLY		127.	127.	2205.		510.	510.	8820.
PMT ASSEMBLY								
DIVIDER		0.	0.	262.	1	0.	0.	262.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	390.		127.	127.	390.

MAXIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 18629.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	10732.
IDT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	10732.

	MINIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	4	900.	3720.	3720.
	M15T	652.				2610.		
	P5T	52.				210.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	4	84.	221.	221.
	M15T	7.				27.		
	P5T	27.				110.		
FOCUS AMPLIFIER	P15T	1050.	2130.	1193.	4	4200.	8520.	4772.
	M15T	1080.				4320.		
HORIZONTAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
VERTICAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		9968.	9968.	9031.		39871.	39871.	36123.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	225.	930.	930.	1	225.	930.	930.
	M15T	652.				652.		
	P5T	52.				52.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	21.	55.	55.	1	21.	55.	55.
	M15T	7.				7.		
	P5T	27.				27.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7754.	7754.	7754.		7754.	7754.	7754.

MINIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 43877.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	8112.	12969.	18790.	0.	0.	0.	0.
PMT ELECTRONICS	930.	2126.	4697.	0.	0.	0.	0.
DEA TOTAL	9042.	15095.	23487.	0.	0.	0.	0.

NOMINAL VALUES		INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC•DC POWER	SEC•DC TOTAL	COMP• DISSIP•	NO• OF UNITS	SEC•DC POWER	SEC•DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP• DISCR• (PAD)	P15T	225•	930•	930•	4	900•	3720•	3720•
	M15T	652•				2610•		
	P5T	52•				210•		
CURRENT-VOLTAGE AMP• (CVA)	P15T	21•	55•	55•	4	84•	221•	221•
	M15T	7•				27•		
	P5T	27•				110•		
FOCUS AMPLIFIER	P15T	1170•	2385•	1208•	4	4680•	9540•	4832•
	M15T	1215•				4860•		
HORIZONTAL DEFLECTION AMP•	P15T	241•	258•	241•	4	963•	1032•	964•
	M15T	17•				69•		
VERTICAL DEFLECTION AMP•	P15T	219•	236•	216•	4	876•	945•	865•
	M15T	17•				69•		
DETECTOR CONTROLLER	P15T	684•	6768•	6768•	4	2736•	27074•	27074•
	M15T	1467•				5868•		
	P5T	4617•				18470•		
TOTAL IDT ELECTRONICS		10633•	10633•	9419•		42532•	42532•	37676•
PMT ELECTRONICS								
PULSE AMP• DISCR• (PAD)	P15T	225•	930•	930•	1	225•	930•	930•
	M15T	652•				652•		
	P5T	52•				52•		
CURRENT-VOLTAGE AMP• (CVA)	P15T	21•	55•	55•	1	21•	55•	55•
	M15T	7•				7•		
	P5T	27•				27•		
DETECTOR CONTROLLER	P15T	684•	6768•	6768•	1	684•	6768•	6768•
	M15T	1467•				1467•		
	P5T	4617•				4617•		
TOTAL PMT ELECTRONICS		7754•	7754•	7754•		7754•	7754•	7754•

NOMINAL TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 45430•

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	10239•	13503•	18790•	0•	0•	0•	0•
PMT ELECTRONICS	930•	2126•	4697•	0•	0•	0•	0•
DEA TOTAL	11169•	15629•	23487•	0•	0•	0•	0•

MAXIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC•DC POWER	SEC•DC TOTAL	COMP• DISSIP•	NO. OF UNITS	SEC•DC POWER	SEC•DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP• DISCR• (PAD)	P15T	225.	930.	930.	4	900.	3720.	3720.
	M15T	652.				2610.		
	P5T	52.				210.		
CURRENT-VOLTAGE AMP• (CVA)	P15T	21.	55.	55.	4	84.	221.	221.
	M15T	7.				27.		
	P5T	27.				110.		
FOCUS AMPLIFIER	P15T	1395.	2805.	1140.	4	5580.	11220.	4560.
	M15T	1410.				5640.		
HORIZONTAL DEFLECTION AMP•	P15T	393.	409.	340.	4	1572.	1638.	1362.
	M15T	16.				66.		
VERTICAL DEFLECTION AMP•	P15T	423.	439.	358.	4	1692.	1758.	1434.
	M15T	16.				66.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		11408.	11408.	9593.		45631.	45631.	38371.
PMT ELECTRONICS								
PULSE AMP• DISCR• (PAD)	P15T	225.	930.	930.	1	225.	930.	930.
	M15T	652.				652.		
	P5T	52.				52.		
CURRENT-VOLTAGE AMP• (CVA)	P15T	21.	55.	55.	1	21.	55.	55.
	M15T	7.				7.		
	P5T	27.				27.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7754.	7754.	7754.		7754.	7754.	7754.

MAXIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 46125.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	12584.	14277.	18790.	0.	0.	0.	0.
PMT ELECTRONICS	930.	2126.	4697.	0.	0.	0.	0.
DEA TOTAL	13494.	16403.	23487.	0.	0.	0.	0.

MINIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MINIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

NOMINAL TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

MAXIMUM VALUES	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MAXIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

	MINIMUM	INDIVIDUAL UNIT				TOTAL ALL UNITS		
		S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)		14343.	4248.	10095.	4	57374.	16993.	40381.
DETECTOR SUPPLY (PMT)		12147.	4266.	7881.	1	12147.	4266.	7881.
DIGITAL SUPPLY		41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR		13314.	3641.	9673.	1	13314.	3641.	9673.
TOTAL		81350.	30851.	50498.		124380.	43596.	80784.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	8112.	12969.	18790.		
IDT TOTAL	8352.	13239.	18790.	40381.	57374.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	930.	2126.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	12147.
TOTAL	9342.	15433.	23487.	48262.	68021.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	9673.	13314.
TOTAL	9673.	13314.

	NOMINAL	INDIVIDUAL UNIT				TOTAL ALL UNITS		
		S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)		15341.	4581.	10760.	4	61365.	18323.	43042.
DETECTOR SUPPLY (PMT)		12147.	4266.	7881.	1	12147.	4266.	7881.
DIGITAL SUPPLY		41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR		13824.	3695.	10129.	1	13824.	3695.	10129.
TOTAL		82857.	31238.	51619.		128881.	44980.	83901.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	10239.	13503.	18790.		
IDT TOTAL	10479.	13773.	18790.	43042.	61365.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	930.	2126.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	12147.
TOTAL	11469.	15967.	23487.	50923.	72013.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	10129.	13824.
TOTAL	10129.	13824.

MAXIMUM	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	16503.	4948.	11535.	4	66014.	19873.	46141.
DETECTOR SUPPLY (PMT)	12147.	4266.	7881.	1	12147.	4266.	7881.
DIGITAL SUPPLY	41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR	14498.	3766.	10732.	1	14498.	3766.	10732.
TOTAL	84693.	31676.	52997.		134204.	46601.	87603.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	12564.	14277.	18790.		
IDT TOTAL	12804.	14547.	18790.	46141.	66014.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	930.	2126.	4697.		
PMT TOTAL	990.	2194.	4697.	7881.	12147.
TOTAL	13794.	16741.	23487.	54022.	76661.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

PREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	10732.	14498.
TOTAL	10732.	14498.

	MINIMUM	NOMINAL	MAXIMUM
HSP (LESS RIU) POWER INPUT	124380.	128881.	134204.
ODS	14058.	15622.	18629.
DETECTOR ELECTRONICS	43877.	45430.	46125.
SYSTEM CONTROLLER	22849.	22849.	22849.
PCDS	43596.	44980.	46601.
SUBASSEMBLY TOTALS	124380.	128881.	134204.

NOMINAL POWER FOR VARIOUS OPERATING MODES (NOT INCLUDING RIU/EU)

COMMON ELECTRONICS	41544.
IDT DETECTOR	18106.
PMT DETECTOR	14912.

CONTINGENCY

ALLOWABLE SI POWER	145000.
LESS RM/EU POWER	5000.
ALLOWABLE HSP POWER	140000.
PRESENT HSP POWER	128881.

CONTINGENCY (140000/128881.-1)*100= 8.63 PERCENT
(NOTE: THIS CONTINGENCY IS BASED ON ALL FIVE DETECTORS OPERATING)

CHANGES FROM THE PREVIOUS BUDGET (NOMINAL VALUES ONLY)

ITEM	POWER SOURCE	WAS	IS	INCREASE	S/C BUS POWER INCREASE
HVPS	28P	10129.	10129.	-0.	0.
PREAMP	P15T	300.	300.	0.	0.
	M15T	337.	337.	0.	
PAD	P15T	1125.	1125.	0.	0.
	M15T	3242.	3262.	0.	
	P5T	262.	262.	0.	
C-V AMPLIFIER	P15T	105.	105.	0.	0.
	M15T	34.	34.	0.	
	P5T	137.	137.	0.	
FOCUS AMP.	P15T	4680.	4680.	0.	0.
	M15T	4860.	4860.	0.	
DEFLECTION AMP.	P15T	1839.	1839.	0.	0.
	M15T	138.	138.	0.	
DET. CONTROLLER	P15T	3420.	3420.	0.	0.
	M15T	7335.	7335.	0.	
	P5T	23087.	23087.	0.	
SYSTEM CONTROLLER	P12D	1104.	1104.	0.	0.
	P5D	21720.	21720.	0.	
	M5D	25.	25.	0.	
			TOTAL		0.
			BUS POWER INCREASE		0.
			PREVIOUS BUS POWER		128881.
			PRESENT BUS POWER		128881.

PCDS HEATER AND TEST LAMP LOADS (NOT INCLUDED IN THE HSP POWER BUDGET TOTALS)

	INCREMENTAL BUS POWER INPUT	SUPPLY COMPONENT DISSIP.	TOTAL OUTPUT POWER
PREREGULATOR			
ODS HEATER 1	1677.	177.	1500.
ODS HEATER 2	3298.	348.	2950.
ODS HEATER 3	6328.	668.	5660.
S/C INPUT BUS			
FORWARD HEATER 1	4000.		4000.
FORWARD HEATER 2	12000.		12000.
FORWARD HEATER 3	16000.		16000.
AFT HEATER 1	6000.		6000.
AFT HEATER 2	18000.		18000.
AFT HEATER 3	24000.		24000.
DIGITAL SUPPLY			
TEST LAMPS	2001.	851.	1150.

NOTES:

1. ALL POWER GIVEN IN MILLIWATTS

2. MINIMUM, NOMINAL, AND MAXIMUM VALUES ARE BASED ON OPERATING MODES OF TYPICAL UNITS ONLY. THEY DO NOT INCLUDE UNIT TO UNIT VARIATIONS.

3. OPERATING CONDITIONS, WITH ALL DETECTORS SIMULTANEOUSLY POWERED WILL BE SUCH THAT THE TOTAL POWER CONSUMPTION WILL RARELY EXCEED THE NOMINAL VALUES IN THE BUDGET

4. POWER SUPPLY EFFICIENCY EQUATIONS USED IN THIS BUDGET ARE AS FOLLOWS:

DETECTOR SUPPLY: S/C BUS POWER=
•••••+ 1.50*(+15 VOLT POWER)+ 1.50*(-15 VOLT POWER)+ 1.25*(+5 VOLT POWER)

DIGITAL SUPPLY: S/C BUS POWER=
•••••+ 1.56*(+12 VOLT POWER)+ 1.74*(+5 VOLT POWER)+ 1.25*(-5 VOLT POWER)

PREREGULATOR: S/C BUS POWER=
•••••+ 1.12*(+28 VOLT POWER)

****** HSP WEIGHT BUDGET ******
3/4/80

PART NAME	X	Y	Z	WT	IOX	IOY	IOZ	ITX	ITY	ITZ
MAIN SPAR	12.09	12.09	42.55	52.50	78.42	78.42	1.55	83.72	83.32	7.34
ELECTRONICS BASEPLATE (EBP)	24.80	24.80	41.30	38.00	59.52	59.52	5.69	66.48	66.99	18.60
MAIN SPAR/EBP INTERFACE	15.19	15.19	42.55	4.30	6.47	6.47	.00	6.68	6.67	.05
FOREWARD BULKHEAD	17.61	17.61	.25	44.50	11.90	11.90	23.81	180.62	180.68	24.01
AFT BULKHEAD	16.50	16.50	84.57	29.00	7.76	7.76	15.01	166.95	166.94	15.02
INTERIOR BULKHEADS	21.71	21.71	42.55	32.40	5.69	5.69	11.65	9.03	9.30	15.86
FREE CORNER BULKHEAD TIES	20.65	20.65	42.55	6.40	9.32	9.32	.00	9.82	9.87	.52
OUTSIDE SKIN	17.61	.00	42.55	15.33	28.47	24.33	3.88	40.39	25.02	15.21
OUTSIDE SKIN	17.61	35.22	42.55	15.33	24.33	28.47	3.88	38.34	29.16	17.30
OUTSIDE SKIN	.00	17.61	42.55	15.33	24.33	28.47	3.88	24.99	39.97	14.76
OUTSIDE SKIN	35.22	17.61	42.55	15.33	28.47	24.33	3.88	29.14	38.81	17.74
ELECTRICAL CONNECTOR PLATE	31.01	31.01	73.30	3.00	.00	.00	.00	10.95	11.02	3.18
FOREWARD REGISTRATION FITTING	7.59	7.59	2.03	6.80	.00	.00	.00	24.94	24.84	2.92
AFT REGISTRATION FITTING	7.00	7.00	83.35	11.10	.00	.00	.00	60.53	60.36	5.41
GSE BRACKETS (FOREWARD)	34.10	1.10	3.15	3.00	.00	.00	.00	11.64	12.10	4.32
GSE BRACKETS (FOREWARD)	1.10	34.10	3.15	3.00	.00	.00	.00	12.02	11.56	4.16
GSE BRACKETS (AFT)	33.40	1.50	81.30	4.30	.00	.00	.00	22.99	23.53	5.79
GSE BRACKETS (AFT)	1.50	33.40	81.30	4.30	.00	.00	.00	23.41	22.89	5.56
GSE BRACKETS (UNIQUE)	33.80	33.80	3.30	2.90	.00	.00	.00	11.46	11.54	4.39
CREWMAN HANDHOLDS	35.50	8.80	42.55	3.75	.00	.00	.00	.79	3.65	4.12
CREWMAN HANDHOLDS	35.50	26.40	42.55	3.75	.00	.00	.00	1.04	3.65	4.37
CREWMAN HANDHOLDS	8.80	35.50	42.55	3.75	.00	.00	.00	3.53	.74	3.95
CREWMAN HANDHOLDS	26.40	35.50	42.55	3.75	.00	.00	.00	3.53	1.10	4.31
CONDUCTOR PANELS AND ANGLES	2.50	23.78	42.55	20.20	32.35	30.02	2.33	35.70	41.18	15.14
CONDUCTOR PANEL AND ANGLES	23.78	2.50	42.55	20.20	30.02	32.35	2.33	41.65	35.94	15.85
LONGITUDINAL FIBERGLASS ANGLES	13.00	13.00	42.55	7.60	11.13	11.13	.00	11.74	11.70	.54
LONGITUDINAL ALUMINUM ANGLES	13.00	13.00	42.55	2.50	3.62	3.62	.00	3.82	3.81	.18
CONDUCTOR PANEL BULKHEADS	11.91	11.91	1.80	1.25	.00	.00	.00	4.44	4.43	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	17.50	1.25	.00	.00	.00	1.51	1.50	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	34.88	1.25	.00	.00	.00	.12	.11	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	52.26	1.25	.00	.00	.00	.69	.68	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	69.64	1.25	.00	.00	.00	3.21	3.20	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	83.71	1.25	.00	.00	.00	6.69	6.68	.15
ODS CLOSEOUT BULKHEADS	5.49	5.49	38.54	1.67	.00	.00	.00	.56	.53	1.09
ODS CLOSEOUT BULKHEADS	5.49	5.49	49.88	1.67	.00	.00	.00	1.12	1.09	1.09
ODS CLOSEOUT BULKHEADS	5.49	5.49	67.28	1.67	.00	.00	.00	4.13	4.10	1.09
CABLE HARNESS	15.30	15.30	42.55	24.00	38.82	38.82	.00	39.98	39.93	.25
FASTENERS AND BRACKETS	17.61	17.61	42.55	10.00	5.18	5.18	5.18	5.61	5.63	5.22
DEA	28.61	28.61	26.24	7.60	.00	.00	.00	5.68	5.83	5.58
DEA	28.61	28.61	26.24	7.60	.00	.00	.00	5.68	5.83	5.58
DEA	19.37	19.37	26.24	7.60	.00	.00	.00	3.09	3.12	.28
DEA	19.37	19.37	26.24	7.60	.00	.00	.00	3.09	3.12	.28
DEA	22.92	25.40	9.56	7.60	.00	.00	.00	17.93	17.29	2.23
SYSCON	23.34	20.40	43.64	15.00	1.04	1.04	.78	2.54	3.85	3.06
PCDS	19.00	24.78	43.64	33.00	1.54	1.54	1.37	9.13	4.29	7.24
SDU	17.52	21.44	76.84	3.00	.00	.00	.00	11.57	11.41	.17
RIU	25.02	23.36	61.04	4.80	.00	.00	.00	6.83	7.19	1.42
RIU + EU	22.72	25.58	61.04	6.90	.00	.00	.00	10.42	9.74	2.04
HEATERS AND PAINT	17.61	17.61	42.55	5.00	2.59	2.59	2.59	2.81	2.81	2.61
ODS	6.01	6.01	19.46	70.00	24.33	24.33	1.81	111.45	110.22	43.24

*** HSP MASS PROPERTIES SUMMARY ****
3/4/80

TOTAL WEIGHT = 594.53 LBS.

CENTERS OF GRAVITY (INCHES)
(SI P-COORDINATES)

P1 = -39.38
P2 = 10.97
P3 = 10.65

MASS MOMENTS OF INERTIA (LB.*IN.*SEC.*SEC.)
(ABOUT HSP CENTER OF GRAVITY)

IP11 = 313.94
IP22 = 1188.90
IP33 = 1194.19
IP12 = 23.46
IP13 = 21.08
IP23 = 34.65

HSP TSU SCHEDULE

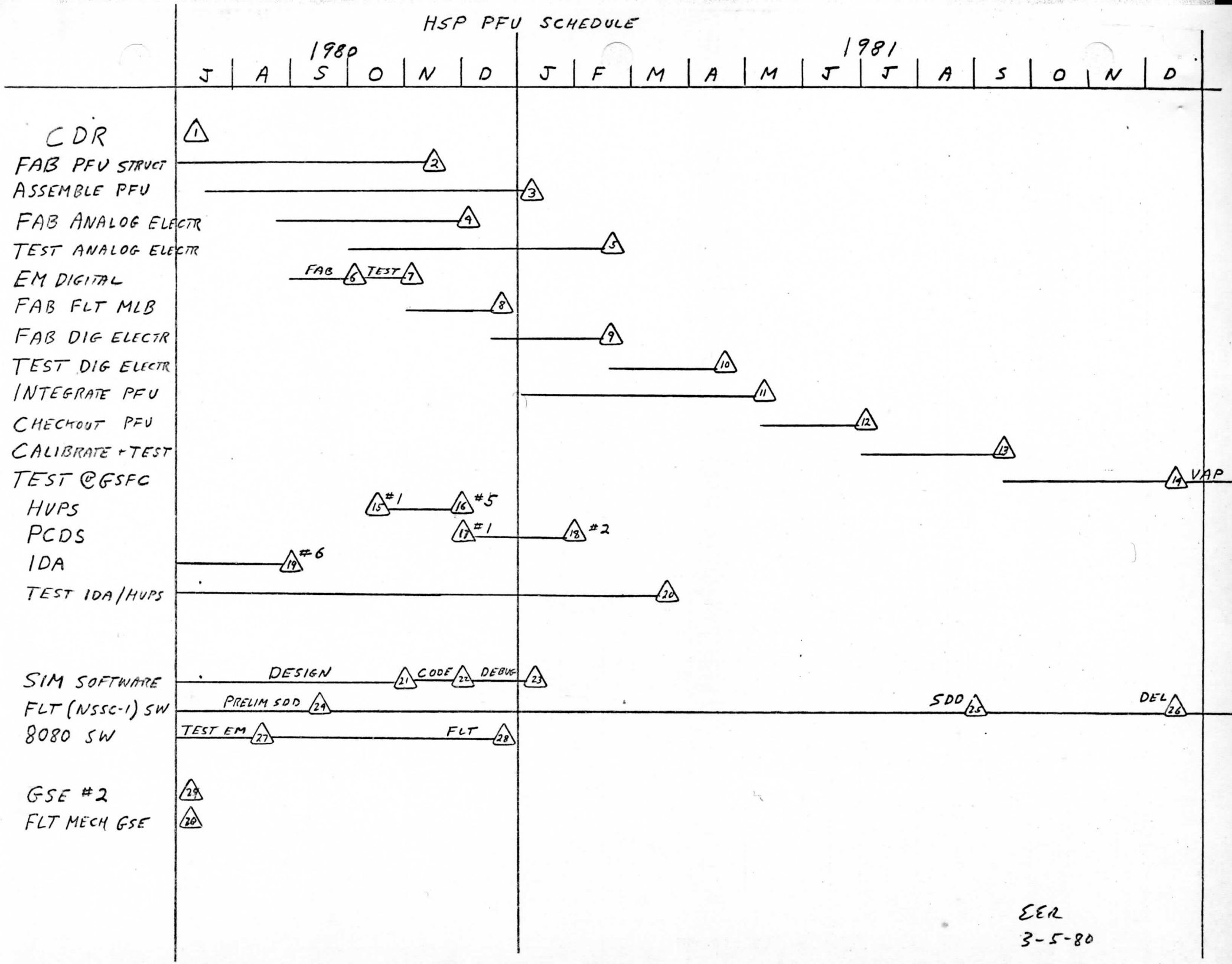
MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		2-11	Internal bulkheads assembled	2-11		
2		2-18	ODS conductor panel, longerons, fiber-glass installed	2-18		
3		2-25	ODS closeout installed, skin attach holes drilled		3-17	
4		2-27	TSU disassembled		3-5	
5		2-29	TSU parts dipped		N/A	Deleted
6		3-5	Structure painted and reassembled		3-17	
7		3-11	Electronic box TSU's,thermocouples,ODS installed		3-19	
8		3-17	Wire harness installed		N/A	Deleted
9		2-7	Box TSU's drilled	2-7		
10		2-14	Box TSU's irridited	2-14		
11		3-4	Box TSU's painted, wired, assembled		3-10	
12		2-14	Dolly design complete	2-14		
13		2-18	Dolly material cut	2-18		
14		3-3	Dolly fabrication complete	3-3		
15		2-11	Shipping container design complete	2-11		
16		2-18	Shipping container material cut	3-4		
17		3-3	Shipping container fabrication complete		3-10	
18		3-17	TSU shipped to GSFC		3-24	GSFC request to delay ship date

HSP PFU SCHEDULE

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
1		7-8-80	Critical Design Review			
1		11-15-80	PFU Struct.Fabrication Complete			
3		1-10-81	PFU Struct.Assembly Complete			
4		12-10-80	Fab Analog Electronics Complete			
4-1		TBD	DEA #1			
4-2		TBD	DEA #2			
4-3		TBD	DEA #3			
4-4		TBD	DEA #4			
4-5		TBD	DEA #5			
4-6		TBD	System Controller			
4-7		TBD	Preamp (5)			
4-8		TBD	SDU			
5		2-15-81	Analog Electronics Test Complete			
6		10-1-80	Fab EM Syst/Det Controller			
7		11-1-80	Test EM Syst/Det Controller			
8		12-15-80	Fab Flight Multilayer Boards			
9		2-18-81	Fab Flight Syst/Det Controller			
10		4-15-81	Test Flight Syst/Det Controller			
11		3-10-81	PFU Integration Complete			
12		7-5-81	PFU Checkout Complete			

MSTONE	NEW/CHANGE	SKD COMPL	DESCRIPTION	ACTUAL	EXPECTED	COMMENTS
13		9-15-81	Ship PFU to GSFC			
14		12-15-81	Deliver to VAP			
15		10-15-80	HVPS #1 Received			
15-1		11-1-80	HVPS #2 Received			
15-2		11-10-80	HVPS #3 Received			
15-3		11-20-80	HVPS #4 Received			
16		12-1-80	HVPS #5 Received			
17		12-1-80	PCDS #1 Received			
18		2-1-81	PCDS #2 Received			
19		9-1-80	IDA #6 Received			
20		3-15-81	IDA/HVPS Tests Complete			
21		11-1-80	Simulator S/W Design Complete			
22		12-1-80	Simulator S/W Coding Complete			
23		1-10-81	Simulator S/W Debugged			
24		9-15-80	Prelim. Flight SDD			
25		9-1-81	Final Flight SDD			
26		12-15-81	Flight S/W Delivered			
27		8-15-80	8080 S/W Tests (EM) Complete			
28		12-20-80	Flight 8080 S/W Complete			
29		7-15-80	GSE #2 Complete			
30		7-15-80	PFU Mechanical GSE Complete			

HSP PFU SCHEDULE



EER
3-5-80

APPENDIX - PARTS STATUS 2/80

As of the 7 March 1980, 100% of the flight parts were ordered and 158 out of 212 line items had been received. Of the remaining line items, only two now have scheduled deliveries later than July 1980.

The attached list details the HSP flight parts status. Some column headings require explanation:

PFUT	PFU total number of parts required for one HSP flight unit
T REQD	Total flight parts required for PFU, spares, screening, qualification, etc.
NEED	Number of parts that must be ordered (T REQD-ON HAND)
ON HAND	Parts available from previous University of Wisconsin flight program inventory
SCR OK	Screened parts ready to be issued to HSP flight fabrication
TO GSFC	Number sent to GSFC/Sperry for screening

VENDOR CODE

HA	Hamilton Avnet
TI	Texas Instruments
AD	Analog Devices
SG	Sangamo
VT	Vitramon
SC	Spectrum Components
UC	Union Carbide
AR	Arrow Electronics
CR	Component Research
ED	Edco Engineering Corporation
OE	Ohm Electronics
UN	Unitrode
NY	Nytronics
YS	Yellow Springs Instruments
PM	Parts Mart
KP	KDI Pyrofilm Corporation
DE	Dale Electronics
KE	Kierulff Electronics
SX	Siliconix
ME	Marsh Electronics
FE	Future Electronics
DP	Diplomat Electronics
GR	Graham Electronics

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
1	AM26LS31	HA	275P236	Rcvd	39	150	150	150	150			
2	AM26LS33	HA	275P236	4/12/80	25	61	61	61				
3	AM91L24	HA	275P236	Rcvd	104	268	268	260	260		26	
4	SNJ54128J	TI	276P651	12/30/80	10	44	44	44				
5	SNJ54LS00J		CRC	4/1/80	15	31	31	31				34
6	SNJ54LS04J		CRC	Rcvd	41	119	119	119	119		119	13
7	SNJ54LS08J		CRC	Rcvd	20	72	72	72	72		72	
8	SNJ54LS11W	TI	276P441 CRC	Rcvd	6	28	28	56	84		28	
9	SNJ54LS26J		CRC	Rcvd	17	37	37	37	37		37	
10	SNJ54LS32J		CRC	4/1/80	12	48	48	48				
11	SNJ54LS74AJ		CRC	Rcvd	36	133	133	133	133		133	
12	SNJ54LS138J		CRC	Rcvd	20	73	73	73	73		73	
13	SNJ54LS157J		CRC	Rcvd	4	22	22	22	22		22	
14	SNJ54LS163AJ		CRC	Rcvd	22	78	78	78	78		78	
15	SNJ54LS165J		CRC	Rcvd	8	54	54	54	54		54	
16	SNJ54LS197J		CRC	Rcvd	20	60	60	60	60		60	
17	SNJ54LS241J	FE	277P421	Rcvd	6	28	28	28	28			
18	SNJ54LS259J		CRC	Rcvd	40	92	92	92	92		92	
19	SNJ54LS373J		CRC	4/1/80	18	88	88	88				
20	SNJ54LS379J	DP	277P384	4/1/80	14	53	53	53				
21	SNJ54LS670J	DP	277P384	4/1/80	4	42	42	42	33			
22	M3636	HA	275P236	Rcvd	8	28	28	32	32		32	
23	M8080	HA	275P236/6P780	4/12/80	2	15	15	15				
24	M8212	HA	275P236/6P780	Rcvd	2	27	27	28	28		28	
25	M8224	HA	275P236	Rcvd	2	7	7	8	8		8	
26	M8228	HA	275P236/6P780	4/12/80	2	27	27	28	8		8	
27	M8257	HA	275P236	Rcvd	2	7	7	8	8		8	

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
28	CD4022AF		CRC	Rcvd	2	18	18		18		18	0
29	CD4040AK				20	40				40		40
30	CD4041AF		CRC	Rcvd	10	26	26	26	26		26	
31	CD4050BD		277P675 CRC	7/1/80	17	60	60	60	47		47	
32	CD4067BD	GR	277P675	7/1/80	40	96	100	100				
33	CD4071BF		CRC	Rcvd	2	18	18	18	18		18	
34	CD4076BF		CRC	Rcvd	8	38	44	44	38		38	
35	CD4094BK	KE	276P846	4Q80	16	84	84	84				
36	SNC55114J	TI	276P441	Rcvd	6	22	22	32	25		19	
37	SNC55115J		CRC	Rcvd	16	43	43	43	43		43	
38	AM685HMB(Comp)	HA	275P741	3/1/80	5	16	16	16				
39	HA1-2420(S/H)	HA	275P295	Rcvd	5	16	16	16	16		16	
40	HA2-2700(OpAmp)	HA	275P295	Rcvd	95	143	138	138	138	5	138	5
41	LM108AH(OpAmp)				5	16				19	19	
42	LM161(Comp)	HA	275P041/6P780	Rcvd	5	36	36	36	36		36	
43	AD562(12bit DAC)	AD	276P006	Rcvd	15	28	28	28	28		28	
44	AD572(12bit ADC)	AD	276P006	4/11/80	5	12	12	12				
45	1pf±0.5pf	SG	274P735	Rcvd	5	16	16	16	16		16	
46	3pf±0.5pf	SG	276P566		2	14	14	14				
47	6pf±0.5pf	SG	276P566	Rcvd	2	14	14	14	14		14	
48	10pf±0.5pf	SG	276P566	Rcvd	2	14	14	14	14		14	
49	1.5pf				5	16				16	16	
50	3.3pf	VT	274P831/7P546	Rcvd	10	22	7	26	26	15	26	
51	47pf	SC			5	16				25	25	
52	1500pf				60	95				197	137	60
53	1mf	UC	274P956	6/20/80	75	119	119	119				
54	22mf±10%	UC	274P956	6/20/80	14	40	40	74				

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
55	33mf±20%	UC	274P956/6P776	6/20/80	30	49	49	49	21			
56	10pf±10%	AR	276P426	4/16/80	15	28	15	28		13	13	
57	33pf±10%	AR	276P426	Rcvd	5	16		16	16	44	60	
58	47pf±10%	AR	276P426	Rcvd	5	16	16	16	16	2	18	
59	68pf±10%	AR	276P426	Rcvd	5	16	16	16	16		16	
60	100pf±10%	AR	276P426	Rcvd	30	49	49	49	49		51	
61	120pf±10%	AR	276P426	4/16/80	10	22		21		30	30	
62	180pf	AR	276P426/662	4/16/80	29	71	71	71	71		6	
63	270pf±10%	AR	276P426	Rcvd	5	16	16	16	16		16	
64	330pf	AR	276P426	Rcvd	15	28	28	28	28		28	
65	390pf	AR	276P426	Rcvd	10	22	22	22	22		22	
66	560pf±10%	AR	276P426	Rcvd	5	16	6	16	16	10	26	
67	1000pf±20%	AR	276P426	Rcvd	90	143	113	127	150	30	180	
68	2200pf±20%	AR	276P426	Rcvd	10	22	20	200	200	2	200	
69	4700pf±20%	AR	276P426	Rcvd	40	64	64	200	68		68	
70	0.01mf±20%	AR	276P426	Rcvd	95	150	150	200	200		200	
71	0.022mf±20%	AR	276P426	Rcvd	35	64	64	200	200		200	
72	0.1mf±20%	AR	276P426/662	Rcvd	484	932	920	920	920	12	600	
73	0.22mf±10%				10	22				31		31
74	220pf	AR	Blanket order	Rcvd	20	35	35	35	35		0	
75	0.01mf±5%,50V	CR	275P262	Rcvd	5	16	16	16	16		16	
76	Transformer	ED	275P936(SDU)	Rcvd	4	14	13	14	14		0	0
77	18.432MHz crys	HA	276P581	4/1/80	2	8	10	10	5		5	
78	1N758A	OE	276P010/603	3/3/80	11	30	30	30	12		12	
79	1N3595				40	64				168		168
80	1N4148				67	193				207	34	161
81	1N4245	UN	274P680	Rcvd	30	49	49	49	49		49	

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
82	1N4376	HA	274P783	Rcvd	20	35	35	35	35		35	
83	1N4454	AR	Blanket order	4/1/80	10	22	22	22				
84	1N4565A	OE	276P010	3/3/80	10	22	22	22	1		1	
85	100nH	SSEC	SSEC manuf		5	16	16					
86	1mH	NY	274P691	3/20/80	30	49	49	49				
87	2.2mH	NY	274P691	3/20/80	45	71	71	71				
88	100mH	NY	274P691	3/20/80	10	22	22	25				
89	U421	SX	276P931	5/15/80	5	26	26	100				
90	U423	SX	276P931	5/15/80	20	35	35	100				
91	2N2219A	AR	Blanket order	4/1/80	10	22	22	22				
92	2N2222A	HA	276P780/7P594	Rcvd/6/1	30	49	49	54	14	60	34	0
93	2N2857	OE	276P010	3/3/80	35	56	56	56				
94	2N2907A	OE	276P010/603	3/3/80	30	49	12	39	10	37	15	32
95	2N3741	HA	276P021		15	28	28	28				
96	2N4119A	SX	276P931	6/15/80	10	42	42	100				
97	2N4858	HA	276P021		10	22	22	22				
98	2N4957	OE	276P010	Rcvd	15	28	28	28	28		28	
99	2N5660	UN	274P680	Rcvd	15	28	28	28	28		28	
100	YSI44901(44004)	YS	275P306	Rcvd				130	130		130	
101	YSI44003A	YS	274P890	6/7/80				16				
102	YSI44909	YS	275P306	Rcvd				16	16		16	
103	10R±5%,1/8W	OE	275P693	Rcvd	10	22	3	100	100	19	100	
104	100R±5%,1/8W				40	64				197	97	100
105	1K±5%,1/8W	OE	276P920	5/13/80	80	156	6	50		150	123	17
106	10K±5%,1/8W				15	28				90	16	64
107	100K±5%,1/8W				12	26				231		82
108	120R±5%,1/8W	OE	275P693	Rcvd	5	16	16	100	100		100	

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
109	12K±5%,1/8W				5	16				44		39
110	150R±5%,1/8W				5	16				55	54	
111	15K±5%,1/8W				5	16				75		72
112	180R±5%,1/8W	OE	275P693	Rcvd	15	28	28	100	100		100	
113	1K8±5%,1/8W				19	37				100	86	14
114	18K±5%,1/8W				20	35				96		96
115	2K±5%,1/8W	OE	275P693	Rcvd	112	201	185	200	200	16	214	2
116	220R±5%,1/8W				5	16				71	71	
117	2K2±5%,1/8W				5	16				100	78	
118	22K±5%,1/8W				25	42				100	100	
119	220K±5%,1/8W				20	35				96	90	
120	240R±5%,1/8W	OE	275P693	Rcvd	5	16		100	100	48	100	
121	2K4±5%,1/8W	OE	275P693	Rcvd	10	22	14	100	100	8	100	
122	240K±5%,1/8W	OE	275P693	Rcvd	15	28	14	100	50	64	100	14
123	27K±5%,1/8W				4	18				87		78
124	3K±5%,1/8W				10	22				88	64	20
125	330R±5%,1/8W				10	22				58	58	
126	3K3±5%,1/8W									67	67	
127	33K±5%,1/8W				12	35				77	63	14
128	36K±5%,1/8W	OE	275P693	Rcvd	10	22	22	100	100		100	
129	3R9±5%,1/8W	OE	275P693	Rcvd	5	16		100	100	83	100	
130	390R±5%,1/8W				5	16				98	98	
131	3K9±5%,1/8W				5	16				58		48
132	47R±5%,1/8W	OE	275P693	Rcvd	5	16		100	50	49	50	1
133	470R±5%,1/8W				10	22				80		80
134	470K±5%,1/8W	OE	275P693	Rcvd	30	49		100	100	111	106	52
135	51R±5%,1/8W	OE	275P693	Rcvd	15	28	8	100	100	20	100	12

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
136	510R±5%,1/8W	OE	275P693	Rcvd	10	22	16	100	100	6	100	
137	51K±5%,1/8W				10	22				97	86	
138	560R±5%,1/8W				5	16				96		
139	5K6±5%,1/8W				15	28				102	102	
140	62K±5%,1/8W	OE	275P693	3/15/80	15	28	16	100		12		12
141	6K8±5%,1/8W				10	22				100	94	
142	75R±5%,1/8W	OE	275P693	Rcvd	10	22	22	100	50		50	
143	750R±5%,1/8W				5	16				99	98	
144	820R±5%,1/8W				5	16				100	100	
145	8K2±5%,1/8W	OE	275P693	Rcvd	30	49	28	100	100	21	100	16
146	91R±5%,1/8W	OE	275P693	3/15/80	10	22	22	100				
147	910R±5%,1/8W	OE	275P693	3/15/80	5	16	16	100				
148	1K±5%,1/4W	OE	275P693(SDU)	Rcvd	8	26	26	300	300		300	
149	150±5%,1/4W	OE	276P603	4/1/80	16	44	42	50		2		
150	6R2±5%,1/4W	OE	276P603	Rcvd	5	16	16	50	50		50	
151	2K±5%,1/4W	OE	275P693(SDU)	Rcvd	4	18	18	200	200		200	
152	150±5%,1/2W	OE	276P603	Rcvd	16	44	44	50	50		50	
153	62±5%,1/2W	OE	276P603	Rcvd	12	35	35	50	50		50	
154	390±5%,1/4W	OE	276P603	Rcvd	4	18	18	50	50		50	
155	11R±5%,1W	OE	275P693	3/15/80	5	16	16	100				
156	100±1%,2W	PM	274P794(SDU)	Rcvd	8	26	26	63	63			
157	249±1%,2W	PM	274P794	Rcvd	10	22	22	22	25		25	
158	49R9±1%,5W	PM	274P794	Rcvd	5	16	16	16	16		16	
159	120R±1%,5W	PM	276P953		30	50	50	50				
160	111Mohms±1%	KP	274P713	3/16/80	5	16	16	16				
161	1000Mohms±1%	KP	274P713	3/16/80	5	16	16	16				
162	10K±1%	DE	275P925	Rcvd	95	150		64	64	232	64	210

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
163	100K±1%				65	103				206		200
164	1000K±1%	DE	275P925	Rcvd	5	16	16	16	16			
165	10K5±1%	DE	275P925	Rcvd	20	35	28	37	37	7	44	
166	105K±1%	DE	275P925	4/24/80	10	22	22	22				
167	11K3±1%	DE	275P925	4/24/80	5	16	16	16				
168	11K8±1%				10	22				27		27
169	12K7±1%				5	16				110		100
170	127K±1%	DE	275P925	Rcvd	5	16	16	16	16		16	
171	143K±1%				5	16				100		100
172	1K54±1%				5	16				26		26
173	158K±1%				10	22				114		104
174	1K65±1%				10	22				94		69
175	165K±1%									27	22	5
176	16K9±1%	DE	275P925	4/24/80	10	22	22	22				
177	174K±1%				5	16				123		105
178	187K±1%				5	16				105		105
179	2K±1%				5	16				127		100
180	20K±1%	DE	275P925	Rcvd	20	35		22	22	78	22	70
181	200K±1%				55	88				216		213
182	2K1±1%				5	16				112		112
183	215K±1%	DE	275P925	4/24/80	5	16		16		100		100
184	232K±1%	DE	275P925	4/24/80	5	16	16	16				
185	249K±1%	DE	275P925	4/24/80	5	16	16	16				
186	26K1±1%				5	16				109		104
187	267K±1%	DE	275P925	4/24/80	5	16	16	16				
188	280K±1%	DE	275P925	4/24/80	5	16	16	16				
189	294K±1%	DE	275P925	4/24/80	5	16	16	16				

ID	PART DESCRIPTION	VENDOR	P.O.No.	DELIVERY	PFUT	T REQD	NEED	ORDERED	RECVD	ON HAND	TO GSFC	SCR OK
190	30K1±1%				5	16				110		110
191	309K±1%	DE	275P925	4/24/80	5	16	16	16				
192	35K7±1%				10	22				110		110
193	5K62±1%				10	22				100		100
194	39K2±1%				10	22				116		110
195	40K2±1%				5	16				119		105
196	45K3±1%	DE	275P925	Rcvd	5	16	16	16	16		16	
197	49R9±1%	DE	275P925	Rcvd	30	49	49	49	49		49	
198	499R±1%				10	22				100		100
199	49K9±1%	OE	275P925	Rcvd	20	35		16	16	112	16	100
200	499K±1%	DE	276P614/5P925	Rcvd	5	16	16	32	32		16	
201	5K11±1%				10	22				138		98
202	511K±1%	DE	275P925	4/24/80	10	22	22	22				
203	53K6±1%				5	16				161		100
204	55K6±1%	DE	275P925	4/24/80	5	16	16	16				
205	5K9±1%				5	16				100		100
206	6K34±1%				5	16				100		100
207	698K±1%	DE	275P925	4/24/80	10	22	22	22				
208	7K15±1%				10	22				125		104
209	750K±1%	DE	275P925	4/24/80	10	22	22	22				
210	7K96±1%	DE	275P925	4/24/80	10	22	22	22				
211	90K9±1%				5	16				153		105
212	9K65±1%	DE	275P925	4/24/80	10	22	22	22				

Don Johnson
SSIAD - ST

DR-MA-02 Number 24
Issued: April 8, 1980

Monthly Report

for

March 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

By the end of March the TSU was nearly complete. Only the attachment of some of the outer skins and cleaning up of various details remained. Delivery to GSFC is scheduled for April 10 (departure from Wisconsin on April 8). The TSU will not have heater wiring or thermocouples installed (heaters, except for forward and aft bulkhead heaters, have been installed). All handling equipment, dolly, slings, and shipping container have been assembled, painted, and tested. Present plans are that instrumentation for the GSFC TSU tests will be installed at GSFC the week after arrival, and testing will begin on April 21.

The order for system controller multilayer boards was issued to Collins Radio in March. Design has begun and is expected to be complete by mid-June. It has already been determined that each redundant half of the system controller can be contained on a single board. The system controller will therefore consist of two boards instead of the three that were previously estimated. This will save considerable board interconnect wiring and perhaps some weight if the box height can be reduced. The present design contains the terminating resistors for the science data interface. If these resistors are to be eliminated (as we understand is the intention) some board space and complexity could be saved if we are promptly advised. Otherwise jumper wires may have to be installed in the flight boards.

A letter received in March from the STSOP raised the issue of radiation resistance of the 8080 microprocessor. We plan to conduct tests at Wisconsin on commercial grade parts to determine if the 1-2k rad susceptibility level quoted is realistic. We will also test the 91L24 RAM device at the same time.

The detector controller test was delayed by non-availability of some interconnect cables which have now been assembled. The test will be run in early April after which the detector controller multilayer board order will be released.

A second set of engineering model detector electronics is complete except for the second deflection amplifier. A new board has been layed out to incorporate the change correcting the current limit problem. The board has been received, parts are on hand, and assembly will be complete in April. The second set will be tested when manpower is available from TSU test activities, probably later in April.

The engineering model wire harness completion has been delayed by late wire deliveries. Alternative sources have been difficult to locate, but most needed material has been obtined. Integration of engineering model electronics should begin in April.

The engineering model PCDS has been received from Collins Radio and will be integrated into the engineering model when the wire harness is complete. The unit meets all requirements except for common mode noise which may be acceptable pending results of common mode susceptibility tests on the PAD.

The delivery of the high voltage power supply engineering model has been delayed until mid-May. The enclosure required rework to remove anodizing in areas where electrical contact is needed. This resulted in loss of the

scheduled EMI test facility. This delay should not impact tests on the engineering model or flight unit deliveries.

The first flight image dissector tube assembly (IDA) has been delayed by the recent decision to have GSFC screen all flight connectors. The high voltage cable/connector assembly for the IDA is supplied by Wisconsin, was recently received from the manufacturer, and had to be sent to GSFC for screening. The first flight IDA is now expected in early May.

The first GSE is complete except for the star simulator and a few minor items, which have temporary work-arounds. The GSE is ready for engineering model tests. The second set of GSE is well along. For most subsystems boards have been wrapped and enclosures are being made. The second set should be complete by the end of May. The star simulator is expected to be completed and tested by mid-May.

Instrument (8080) software is complete, coded, and ready for testing on the engineering model. Flight (C&DH) software PDL has been reviewed by IBM and their comments are being incorporated. GSE software is coded, tested, and debugged with the exception of a few elements which will be ready when needed.

The C&DH computer room is progressing on schedule and will be complete in time for the PDP11/70 to be installed on April 7. The C&DH simulator computer hardware has been received and is ready for installation.

At the end of the month there were 36 line items on the 212 line item flight parts list that had not been received. Only the 4094 has a delivery date later than July 1.

Revised power and weight budgets were submitted last month. Since the last report there have been no changes.

B. Schedule

The TSU ship date is now April 8 with arrival at GSFC on April 10. There are no changes to the PFU schedule submitted last month.

C. Problem Areas

There are no major problems to report.

D. Science Section

The next team meeting will be at GSFC during the TSU testing. The final selection of filters will be a major topic of discussion.

E. Documentation Section

The major documentation activity has been concerned with CM-03, GSE description, which will continue in April.

F. CCB Activity

Technical Directions	Action
HSP-009	Preliminary response by letter to R.White dated 3/11
SI-SI C&DH PIRNs	
013-020	Received 3/13
SI-OTA/SSM PIRNs	
2033R1	Approved 3/31
STR-02B PSCNs	
29R1	Received 3/31
32	Received 3/31
35	Received 3/31

Don Johnson

DR-MA-02 Number 25
Issued: May 2, 1980

Monthly Report

for

April 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.AccountNo.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The HSP TSU was delivered to GSFC at 4:35p.m. on April 9. The following day the TSU and mechanical GSE were unloaded at building 7 and moved to building 15 for unpacking and receiving inspection. All equipment arrived in good condition. (The only casualty was the truck itself. The HSP handling dolly was not constrained from vertical motion at the rear end. The bouncing of the truck resulted in the dolly hammering its rear wheels through the truck floor. The dolly was not damaged.) The TSU was weighed and placed on a surface plate for measurement of some major interface dimensions. All dimensions were within required limits and weight was as expected (see appendix A for detailed HSP weight budget and mass properties information). After the GSFC designed registration fittings were fit checked, the TSU was moved to the downflow tent in building 7 for installation of accelerometers, strain guages, and alignment cubes for mechanical and structural tests. At the end of April the instrumentation was installed, fittings installed, and the HSP was mounted in the GSFC structural test fixture. The first tests are: CG measurement, preload sensitivity, optical reference measurements, and dynamic linearity. By the end of May the TSU is expected to be in the modal survey test.

All mechanical GSE (dolly, slings, shipping container, etc) performed as expected. With a few minor changes the same design will be used for the flight mechanical GSE.

The design of the system controller multilayer board was nearly complete in April. The design was reviewed connection by connection at Collins Radio on April 22-25. The connections to the terminals had not been completed in time for the review. After that is complete the design will be entered into the automated design and production system (digitized), rechecked, and then engineering boards will be produced. The first boards are now expected in early July. In response to PIRN 003, the science data interface resistors were removed.

The detector controller test was further delayed by several small wiring errors in the wire wrap board. The test is now expected to be completed in early May. The second detector controller wire wrap board has been assembled and will be tested immediately after the first.

The engineering model image dissector tube assembly (IDA) will be tested with the first set of engineering model detector electronics using the test equipment set up for the detector controller tests. The engineering model IDA tests are expected to be completed in May. Flight unit IDA will be tested using the same test configuration. The first flight model IDA is expected the first week in May, the second late in May, and the third in mid June. The third flight IDA is scheduled to be the first UV (CsTe cathode) tube delivery; the first two are visual (S-20 cathode) tubes.

The second set of engineering model analog electronics is complete and is now being tested. The tests are expected to be complete by mid May.

The engineering model HVPS delivery will be delayed beyond the expected date of May 16 because of problems encountered during EMI tests in late April. Some redesign and retest are required and a new delivery date has not been established.

The engineering model wire harness (aft section -- known as the "spruce goose") has been completed and checked out. Completion was delayed by late deliveries of several types of wire and cables. Integration of the engineering model subsystem has now begun and is expected to continue through May. The RIU's will first be interfaced to the GSE, then the system controller and PCDS, followed by the detector controller. Finally, the analog electronics and the IDA will be integrated. Integration is proceeding from "back to front" until the entire system is complete.

The first GSE unit is ready to support the engineering model integration. It is complete except for a few missing parts which have been replaced by temporary substitutions until the correct parts arrive. Unit #2 is well along, but cannot be completed until some critical parts are received. The star simulator is also not complete, but is not needed for engineering model integration.

Software for the 8080 and GSE are also ready to support engineering model integration. Work continues on NSSC-1 flight software and ground data analysis software.

The C&DH simulator room was finally completed hours before the PDP 11/70 was installed. The IBM crew was here in mid April to install the simulator, perform formal acceptance, and conduct training classes and workshops. All activities were completed without major difficulty and several complimentary observations were offered by the IBM representatives about the facility for the C&DH simulator.

As of May 1 there were 10 of 212 line items of the flight electronics parts that had not been received. All parts are due by July 1.

Fabrication of the flight unit box beam will begin as soon as the material is available, which is expected to be in May. Fabrication of flight unit mechanical parts must begin prior to completion of TSU tests and CDR to maintain PFU schedule. Major PFU structural assembly will not begin until TSU tests are complete if the present TSU schedule is maintained.

B. Schedule

The HSP schedule in the new format requested by GSFC is attached. The most significant item to note is the CDR date, which is August 26/27, 1980. The CDR date was chosen to be about one month after the scheduled completion of TSU tests at GSFC, now expected to be July 24. The present official CDR date of July 8 will occur during TSU thermal vacuum tests. Because the structural and thermal designs of the HSP are so closely interrelated, it would not make sense to review one without the other. The planning of near term activities is being done consistent with a late August CDR. A July CDR would not be meaningful nor complete.

C. Problem Areas

There are no major problem areas to report.

D. Science Section

The next team meeting will be at GSFC, most likely in mid June. The topics for the meeting will be the filters for the HSP and TSU status to date. Another team meeting in Madison, which will consist of a CDR dry run, is planned for early August.

E. Documentation Section

Documentation for flight unit fabrication and CDR are the major areas of activity.

F. CCB Activity

SI-C&DH ICD PIRN's	Action
013A-018	Approved at 4/1-2 IFWG
020-024	Approved at 4/1-2 IFWG
029	Approved at 4/1-2 IFWG
030	Not approved -- impact statements requested

T.D.'s	
HSP-010	Received 4/14

STR-02 PSCN's	
29R1	Not approved 4/7
36	Approved at 4/10 IFWG
Unnumbered (RH reqs for pre launch and ground test)	Approved at 4/10 IFWG

Appendix A - HSP Weight Budget and Mass Properties Report

The actual measured weight of the HSP TSU at GSFC is 550.01 lb. Table 1 (HSP TSU/PFU Weight Comparison) shows the changes in each item expected between the TSU and the PFU. The reasons for these changes are as follows:

Item 4	The forward guiderail interfaces have been fabricated and weighed at GSFC. The actual weight of the parts is 3.87 lb. The remaining 0.13 lb is allowance for fasteners.
Items 15,17,18	The flight unit will be built with G-10 fiberglass from a vendor other than that used for the TSU. The flight fiberglass has a greater density. The PFU weight is calculated from the TSU measured weight of the parts adjusted for the change in material density.
Item 19	The cable harness weight has been calculated in detail using a complete wire harness connection list to determine the total quantity of each wire type. The wire weight has been measured. Connectors have been measured and allowance made for ties, clamps, etc. The TSU contains no wire harness.
Item 21	The DEA TSU boxes are heavier than the latest PFU DEA weight estimate which is based on: -- actual flight configuration (engineering model) analog electronics and structure -- calculated digital electronics weight based on wire-wrap engineering model and previous program multilayer board measured weights.
Item 25	The RIU specification weight (C&DH ICD) has increased from the weight of the actual RIU TSU.
Items 26,27	These items account for hardware not on the TSU: bulkhead heaters, aperture plate assemblies, filters, ODS connector brackets, etc.

The "PFU weight" column of Table 1 is the weight shown in the HSP weight budget, Table 2, in the "present weight" column. The numbers in the "change" column represent changes from the last reported weight budget and are not the changes between TSU and PFU shown in Table 1. The design maturity code for each element has been reviewed and is appropriate.

Figure 1, HSP Weight History, is based on our records of predicted and calculated weight as reported in the HSP monthly report.

Tables 3 and 4 summarize the mass properties of the TSU and PFU.

Table 1
HSP TSU/PFU Weight Comparison
April 1980

	Part	TSU Wgt	PFU Wgt	PFU Wgt	Comments
1.	Main Spar	52.5	0.0	52.5	
2.	Electronics Baseplate (EBP)	38.0	0.0	38.0	
3.	Main Spar/EBP Interface	4.3	0.0	4.3	
4.	Forward Bulkhead	44.5	4.0	48.5	Forward guiderail interface not in TSU
5.	Aft Bulkhead	29.0	0.0	29.0	
6.	Interior Bulkheads (8)	32.4	0.0	32.4	
7.	Free Cnr Bulkhead Ties	5.4	0.0	5.4	
8.	Outside Skin	57.0	0.0	57.0	
9.	Electrical Conn Plate	3.3	0.0	3.3	
10.	Forward Reg. Fitting	6.8	0.0	6.8	
11.	Aft Reg. Fitting	11.1	0.0	11.1	
12.	GSE Brackets (6)	17.5	0.0	17.5	
13.	Crewman Handhold Brackets	15.5	0.0	15.5	
14.	Conductor Panels,Angles (2)	33.1	0.0	33.1	
15.	Longit.Fiberglass Angles(6)	6.16	2.74	8.90	Reflects 30.8% less density of Distributech G-10 fiberglass
16.	Longit.Aluminum Angles (3)	2.50	0.0	2.50	

17.	Conductor Panel Bulkhds (6)	5.20	2.30	7.50	" " " "
18.	ODS Closeout Bulkhds (3)	6.0	1.00	7.00	" " " " (Not full weight is fiberglass)
19.	Cable Harness	0.0	26.00	26.0	
20.	Fasteners and Brackets	18.12	0.0	18.12	Calculated from subracting the known TSU weights of this table from the GSFC-measured TSU weight (551.01).
21.	DEA's for IDT's and PMT(5)	39.5	-7.0	32.5	Reflects new best estimate
22.	System Controller	15.0	0.0	15.0	
23.	PCDS	33.0	0.0	33.0	
24.	SDU	3.0	0.0	3.0	
25.	RIU (2) and EU	10.7	1.0	11.7	Reflects RIU spec. weight change
26.	Heaters	0.0	2.0	2.0	No real PFU heater mass in TSU
27.	ODS	61.43	8.57	70.0	No aperture, IDT shim plates, cable, connector bracket, etc in TSU (61.43 is ODS subassembly weight and interface channels).
		550.01		591.62	

Table 2

HSP Weight Budget (5/1/80)

Ref: 1) HSP (3/4/79) Weight Budget
2) Space Telescope Weight Control Plan

		Last Rpt Wgt	Pres.Wgt	Change	Des.Matur.	% Req.Conting	Req.Conting Wgt	Notes
1	Main Spar	52.5	52.5	0	A	0	0	1
2	Electronics Baseplate (EBP)	38.0	38.0	0	A	0	0	1
3	Main Spar/EBP Interface	4.3	4.3	0	A	0	0	1
4	Forward Bulkhead	44.5	48.5	+4.0	A	0	0	1,2
5	Aft Bulkhead	29.0	29.0	0	A	0	0	1
6	Interior Bulkheads	32.4	32.4	0	A	0	0	1
7	Free Cnr Bulkhead Ties	6.4	5.4	-1.0	A	0	0	1,4
8	Outside Skin	61.3	57.0	-4.3	A	0	0	1,4
9	Electrical Conn Plate	3.0	3.3	+0.3	A	0	0	1,4
10	Forward Reg Fitting	6.8	6.8	0	A	0	0	1
11	Aft Reg Fitting	11.1	11.1	0	A	0	0	1
12	GSE Brackets (6)	17.5	17.5	0	A	0	0	1
13	Crewman H'hold Brkets	15.0	15.5	+0.5	A	0	0	1
14	Conductor Panels, Angles	40.4	33.1	-7.3	A	0	0	1,4
15	Longit.Fiberglass Angles (6)	7.6	8.9	+1.3	A	0	0	1,4
16	Longit.Aluminum Angles (3)	2.5	2.5	0	A	0	0	1

17	Conductor Panel Bulkheads (6)	7.5	7.5	0	A	0	0	1
18	ODS Closeout Bulkheads (3)	5.0	7.0	+2.0	A	0	0	1,4
19	Cable Harness	24.0	26.0	+2.0	PR	8	2.08	5
20	Fasteners and Brackets	10.0	18.12	+8.12	A	0	0	1
21	DEA's for IDT's and PMT (5)	38.0	32.5	-5.5	CR	8	2.6	6
22	System Controller	15.0	15.0	0	PR	3	0.45	
23	PCDS	33.0	33.0	0	Spec	0	0	1,3
24	SDU	3.0	3.0	0	PR	8	0.24	
25	RIU (2) and EU (1)	11.7	11.7	0	Spec	0	0	
26	Heaters	5.0	2.0	-3.0	PR	8	0.16	7
27	ODS	70.0	70.0	0	Spec/CR/A	3	2.1	
		594.5	591.62	-2.88			7.63	

Summary

Launch Limit Weight	600.00	Present Weight	591.62	
Required Contingency	7.63	Present Contingency	8.38	
Predicted Launch Weight	599.25	Actual or Spec Weight	501.43	84.8%

Notes

1. Weight is actual Thermal Structural Unit weight.

2. Increase is due to the inclusion of the forward guiderail interface angles which were not included in the previous weight budget.

3. The PCDS is a subcontracted item. The engineering model PCDS weighs 36 lb. Design changes will result in a flight unit weight of not more than 33 lb. The PCDS specification weight is 33 lb.

4. Redesign

5. New design and refined calculation.

6. Weight calculated from measured weight of flight configuration (engineering model) analog electronics and structure, and estimated weight of flight digital electronics (based on engineering model wire wrap).

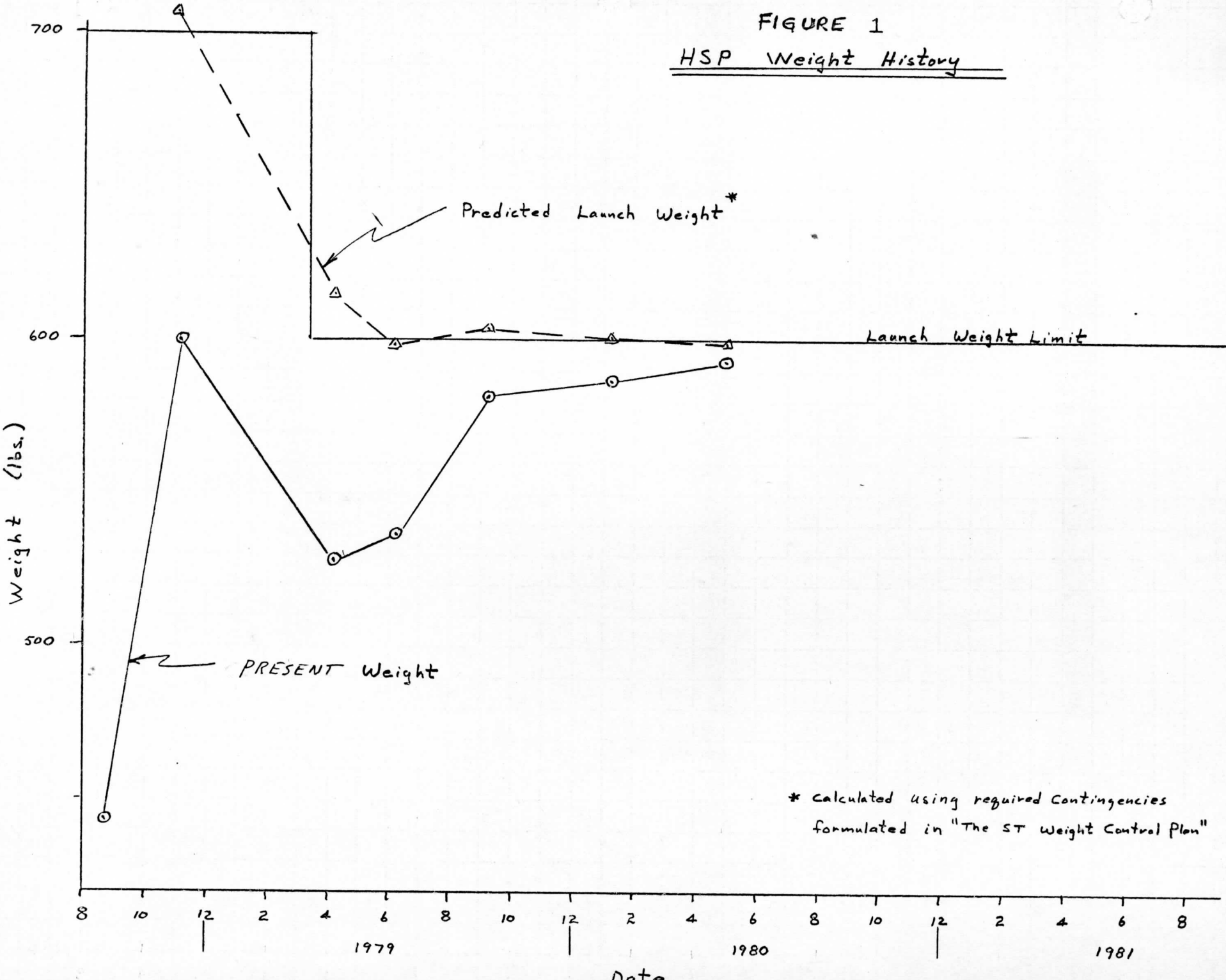
7. Heaters have been redesigned in accordance with the current ICD and thermal model. Present heater weight budget can accommodate anticipated adjustments resulting from TSU thermal tests.

Acronyms

A	Actual (design maturity code: actual weight)
CR	Released drawing (design maturity code: weight calculated from released drawings)
DEA	Detector Electronics Assembly
EBP	Electronics Base Plate
EU	Expander Unit
GSE	Ground Support Equipment
IDT	Image Dissector Tube
ODS	Optical and Detector Subsystem
PCDS	Power Converter and Distribution Subsystem
PMT	Photo Multiplier Tube
PR	Prereleased (design maturity code: weight calculated from prereleased drawings)
RIU	Remote Interface Unit
SDU	Signal Distribution Unit
Spec.	Specification (design maturity code: weight is a specification weight)

FIGURE 1

HSP Weight History



* Calculated using required Contingencies formulated in "The ST Weight Control Plan"

Table 3

**** TSU FINAL CONFIGURATION ****
4/28/80

PART NAME	X	Y	Z	WT	IOX	IOY	IOZ	ITX	ITY	ITZ
MAIN SPAR	12.09	12.09	42.55	52.50	78.42	78.42	1.55	84.15	83.69	8.11
ELECTRONICS BASEPLATE (EBP)	24.80	24.80	41.30	38.00	59.52	59.52	5.69	66.02	66.54	17.67
MAIN SPAR/EBP INTERFACE	15.19	15.19	42.55	4.30	6.47	6.47	.00	6.70	6.68	.07
FORWARD BULKHEAD	17.61	17.61	.25	44.50	12.97	12.97	25.95	181.50	181.55	26.04
AFT BULKHEAD	16.50	16.50	84.57	29.00	7.76	7.76	15.01	167.08	167.05	15.05
INTERIOR BULKHEADS	21.71	21.71	42.55	32.40	5.69	5.69	11.65	8.79	9.07	15.37
FREE CORNER BULKHEAD TIES	20.65	20.65	42.55	5.40	7.86	7.86	.00	8.26	8.30	.37
OUTSIDE SKIN	17.61	.00	42.55	14.25	26.47	22.62	3.61	37.95	23.25	14.51
OUTSIDE SKIN	17.61	35.22	42.55	14.25	22.62	26.47	3.61	35.24	27.10	15.65
OUTSIDE SKIN	.00	17.61	42.55	14.25	22.62	26.47	3.61	23.23	37.52	14.06
OUTSIDE SKIN	35.22	17.61	42.55	14.25	26.47	22.62	3.61	27.08	35.70	16.09
ELECTRICAL CONNECTOR PLATE	31.01	31.01	73.30	3.30	.00	.00	.00	11.98	12.06	3.35
FORWARD REGISTRATION FITTING	7.59	7.59	2.03	6.80	.00	.00	.00	25.02	24.91	3.12
AFT REGISTRATION FITTING	7.00	7.00	83.35	11.10	.00	.00	.00	60.75	60.56	2.75
GSE BRACKETS (FORWARD)	34.10	1.10	3.15	3.00	.00	.00	.00	11.71	12.02	4.32
GSE BRACKETS (FORWARD)	1.10	34.10	3.15	3.00	.00	.00	.00	11.93	11.62	4.15
GSE BRACKETS (AFT)	33.40	1.50	81.30	4.30	.00	.00	.00	23.12	23.44	5.79
GSE BRACKETS (AFT)	1.50	33.40	81.30	4.30	.00	.00	.00	23.31	23.00	5.55
GSE BRACKETS (UNIQUE)	33.80	33.80	3.30	2.90	.00	.00	.00	11.38	11.46	4.24
CREWMAN HANDHOLDS	35.50	8.80	42.55	3.88	.00	.00	.00	.87	3.67	4.20
CREWMAN HANDHOLDS	35.50	26.40	42.55	3.88	.00	.00	.00	1.02	3.67	4.36
CREWMAN HANDHOLDS	8.80	35.50	42.55	3.88	.00	.00	.00	3.54	.81	4.02
CREWMAN HANDHOLDS	26.40	35.50	42.55	3.88	.00	.00	.00	3.54	1.08	4.29
CONDUCTOR PANELS AND ANGLES	2.50	23.78	42.55	16.55	26.50	24.60	1.91	29.08	34.09	12.57
CONDUCTOR PANEL AND ANGLES	23.78	2.50	42.55	16.55	24.60	26.50	1.91	34.52	29.28	13.20
LONGITUDINAL FIBERGLASS ANGLES	13.00	13.00	42.55	6.16	13.03	13.03	.00	13.57	13.53	.51
LONGITUDINAL ALUMINUM ANGLES	13.00	13.00	42.55	2.50	3.62	3.62	.00	3.84	3.82	.21
CONDUCTOR PANEL BULKHEADS	11.91	11.91	1.80	.87	.00	.00	.00	3.10	3.09	.12
CONDUCTOR PANEL BULKHEADS	11.91	11.91	17.50	.87	.00	.00	.00	1.06	1.05	.12
CONDUCTOR PANEL BULKHEADS	11.91	11.91	34.88	.87	.00	.00	.00	.09	.08	.12
CONDUCTOR PANEL BULKHEADS	11.91	11.91	52.26	.87	.00	.00	.00	.49	.48	.12
CONDUCTOR PANEL BULKHEADS	11.91	11.91	69.64	.87	.00	.00	.00	2.25	2.24	.12
CONDUCTOR PANEL BULKHEADS	11.91	11.91	83.71	.87	.00	.00	.00	4.66	4.66	.12
ODS CLOSEOUT BULKHEADS	5.49	5.49	38.54	2.00	.00	.00	.00	.71	.67	1.37
ODS CLOSEOUT BULKHEADS	5.49	5.49	49.88	2.00	.00	.00	.00	1.38	1.34	1.37
ODS CLOSEOUT BULKHEADS	5.49	5.49	67.28	2.00	.00	.00	.00	4.99	4.95	1.37
FASTENERS AND BRACKETS	17.61	17.61	42.55	18.10	10.33	10.33	10.33	11.11	11.13	10.37
DEA	28.61	28.61	26.24	7.90	.00	.00	.00	5.75	5.91	5.51
DEA	28.61	28.61	26.24	7.90	.00	.00	.00	5.75	5.91	5.51
DEA	19.37	19.37	26.24	7.90	.00	.00	.00	3.17	3.21	.23
DEA	19.37	19.37	26.24	7.90	.00	.00	.00	3.17	3.21	.23
DEA	22.92	25.40	5.56	7.90	.00	.00	.00	18.51	17.88	2.14
SYSCON	23.34	20.40	43.64	15.00	1.04	1.04	.78	2.46	3.71	2.83
PCDS	19.00	24.78	43.64	33.00	1.54	1.54	1.37	8.74	4.19	6.71
SCU	17.52	21.44	76.84	3.00	.00	.00	.00	11.55	11.42	.15
RIU	25.02	23.36	81.04	4.30	.00	.00	.00	6.08	6.40	1.17
RIU + EU	22.72	25.58	81.04	6.40	.00	.00	.00	9.58	8.99	1.75
ODS	6.01	6.01	19.46	61.43	20.70	20.70	1.55	98.15	96.95	39.97

Table 3 (cont.)

```
***  FSP MASS PROPERTIES SUMMARY  ****
                4/28/80
                  TSU


TOTAL WEIGHT  =  551.03   LBS.


CENTERS OF GRAVITY (INCHES)
     (SI P-COORDINATES)

     P1 =  -39.40
     P2 =   11.28
     P3 =   10.94


MASS MOMENTS OF INERTIA   (LB.*IN.*SEC.*SEC.)
   (ABOUT FSP CENTER OF GRAVITY)

     IP11 =   304.00
     IP22 =  1112.92
     IP33 =  1117.92
     IP12 =    18.84
     IP13 =    16.54
     IP23 =    34.18
```

Table 4

**** HSP WEIGHT BUDGET ****
4/28/80

PART NAME	X	Y	Z	WT	IOX	IOY	IOZ	ITX	ITY	ITZ
MAIN SPAR	12.09	12.09	42.55	52.50	78.42	78.42	1.55	83.73	83.34	7.20
ELECTRONICS BASEPLATE (EBP)	24.80	24.80	41.30	38.00	59.52	59.52	5.69	66.62	67.12	18.78
MAIN SPAR/EBP INTERFACE	15.19	15.19	42.55	4.30	6.47	6.47	.00	6.69	6.68	.05
FOREWARD BULKHEAD	17.61	17.61	.25	48.50	12.97	12.97	25.95	196.13	196.21	26.19
AFT BULKHEAD	16.50	16.50	84.57	29.00	7.76	7.76	15.01	167.47	167.47	15.02
INTERIOR BULKHEADS	21.71	21.71	42.55	32.40	5.69	5.69	11.65	9.13	9.40	15.95
FREE CORNER BULKHEAD TIES	20.65	20.65	42.55	5.40	7.86	7.86	.00	8.31	8.34	.45
OUTSIDE SKIN	17.61	.00	42.55	14.25	26.47	22.62	3.61	37.50	23.29	14.07
OUTSIDE SKIN	17.61	35.22	42.55	14.25	22.62	26.47	3.61	35.76	27.14	16.17
OUTSIDE SKIN	.00	17.61	42.55	14.25	22.62	26.47	3.61	23.27	37.12	13.66
OUTSIDE SKIN	35.22	17.61	42.55	14.25	26.47	22.62	3.61	27.12	36.19	16.58
ELECTRICAL CONNECTOR PLATE	31.01	31.01	73.30	3.30	.00	.00	.00	12.10	12.18	3.53
FOREWARD REGISTRATION FITTING	7.59	7.59	2.03	6.80	.00	.00	.00	24.82	24.72	2.89
AFT REGISTRATION FITTING	7.00	7.00	83.35	11.10	.00	.00	.00	60.70	60.52	5.35
GSE BRACKETS (FOREWARD)	34.10	1.10	3.15	3.00	.00	.00	.00	11.58	12.08	4.32
GSE BRACKETS (FOREWARD)	1.10	34.10	3.15	3.00	.00	.00	.00	11.99	11.51	4.16
GSE BRACKETS (AFT)	33.40	1.50	81.30	4.30	.00	.00	.00	23.05	23.63	5.79
GSE BRACKETS (AFT)	1.50	33.40	81.30	4.30	.00	.00	.00	23.51	22.94	5.57
GSE BRACKETS (UNIQUE)	33.80	33.80	3.30	2.90	.00	.00	.00	11.44	11.52	4.42
CREWMAN HANDHOLDS	35.50	8.80	42.55	3.88	.00	.00	.00	.81	3.80	4.27
CREWMAN HANDHOLDS	35.50	26.40	42.55	3.88	.00	.00	.00	1.09	3.80	4.56
CREWMAN HANDHOLDS	8.80	35.50	42.55	3.88	.00	.00	.00	3.68	.76	4.10
CREWMAN HANDHOLDS	26.40	35.50	42.55	3.88	.00	.00	.00	3.68	1.16	4.50
CONDUCTOR PANELS AND ANGLES	2.50	23.78	42.55	16.55	26.50	24.60	1.91	29.31	33.70	12.37
CONDUCTOR PANEL AND ANGLES	23.78	2.50	42.55	16.55	24.60	26.50	1.91	34.08	29.51	12.95
LONGITUDINAL FIBERGLASS ANGLES	13.00	13.00	42.55	8.90	13.03	13.03	.00	13.75	13.70	.61
LONGITUDINAL ALUMINUM ANGLES	13.00	13.00	42.55	2.50	3.62	3.62	.00	3.83	3.81	.17
CONDUCTOR PANEL BULKHEADS	11.91	11.91	1.80	1.25	.00	.00	.00	4.42	4.41	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	17.50	1.25	.00	.00	.00	1.50	1.49	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	34.88	1.25	.00	.00	.00	.12	.11	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	52.26	1.25	.00	.00	.00	.70	.69	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	69.64	1.25	.00	.00	.00	3.23	3.22	.15
CONDUCTOR PANEL BULKHEADS	11.91	11.91	83.71	1.25	.00	.00	.00	6.71	6.70	.15
ODS CLOSEOUT BULKHEADS	5.49	5.49	38.54	2.33	.00	.00	.00	.77	.73	1.50
ODS CLOSEOUT BULKHEADS	5.49	5.49	49.88	2.33	.00	.00	.00	1.56	1.52	1.50
ODS CLOSEOUT BULKHEADS	5.49	5.49	67.28	2.33	.00	.00	.00	5.79	5.74	1.50
FASTENERS AND BRACKETS	17.61	17.61	42.55	18.10	10.33	10.33	10.33	11.15	11.18	10.42
CABLE HARNESS	15.30	15.30	42.55	26.00	42.05	42.05	.00	43.34	43.29	.25
DEA	28.61	28.61	26.24	6.50	.00	.00	.00	4.85	4.98	4.82
DEA	28.61	28.61	26.24	6.50	.00	.00	.00	4.85	4.98	4.82
DEA	19.37	19.37	26.24	6.50	.00	.00	.00	2.62	2.64	.25
DEA	19.37	19.37	26.24	6.50	.00	.00	.00	2.62	2.64	.25
DEA	22.92	25.40	9.56	6.50	.00	.00	.00	15.28	14.73	1.94
SYSCON	23.34	20.40	43.64	15.00	1.04	1.04	.78	2.59	3.91	3.10
PCDS	19.00	24.78	43.64	33.00	1.54	1.54	1.37	9.28	4.39	7.34
SDU	17.52	21.44	76.84	3.00	.00	.00	.00	11.61	11.46	.18
RIU	25.02	23.36	61.04	4.80	.00	.00	.00	6.88	7.25	1.44
RIU + EU	22.72	25.58	61.04	6.90	.00	.00	.00	10.50	9.81	2.07
ODS	6.01	6.01	19.46	70.00	24.33	24.33	1.81	110.69	109.48	42.79
HEATERS	17.61	17.61	42.55	2.00	1.04	1.04	1.04	1.13	1.13	1.05

FORM 1411
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Table 4 (cont.)

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***  FSP MASS PROPERTIES SUMMARY  ****
              4/28/80


TOTAL WEIGHT  =  591.61   LBS.


CENTERS OF GRAVITY (INCHES)
     (SI P-COORDINATES)

     P1 =  -39.46
     P2 =   10.91
     P3 =   10.60


MASS MOMENTS OF INERTIA   (LB.*IN.*SEC.*SEC.)
  (ABOUT FSP CENTER OF GRAVITY)

     IP11 =    309.74
     IP22 =   1188.06
     IP33 =   1193.30
     IP12 =     24.68
     IP13 =     22.05
     IP23 =     36.40
```

HSP MASTER SCHEDULE

5/1

1980: A M J J A S O N D

1981: J F M A M J J A S

STRUCTURE:

TSU TESTS — STRUCT — TV — CDR

PFU ASSY — BOX BEAM — EPB/BULK — ODS / CONO / SKINS

MGSE — DESIGN *SIM IIF — FAB PFU DOLLY — FAB PFU SHIPPING CONTAINER

INTEGRATION + TEST — INST W/H — INT+TEST — TEST — CALIBRATE — SHIP TO GSFC

GSE — UNIT 1 T — #2 F — #2T

ENGR MODEL — ASSY — TEST — TEST SIM S/W

DOCUMENTATION — CDR PKG

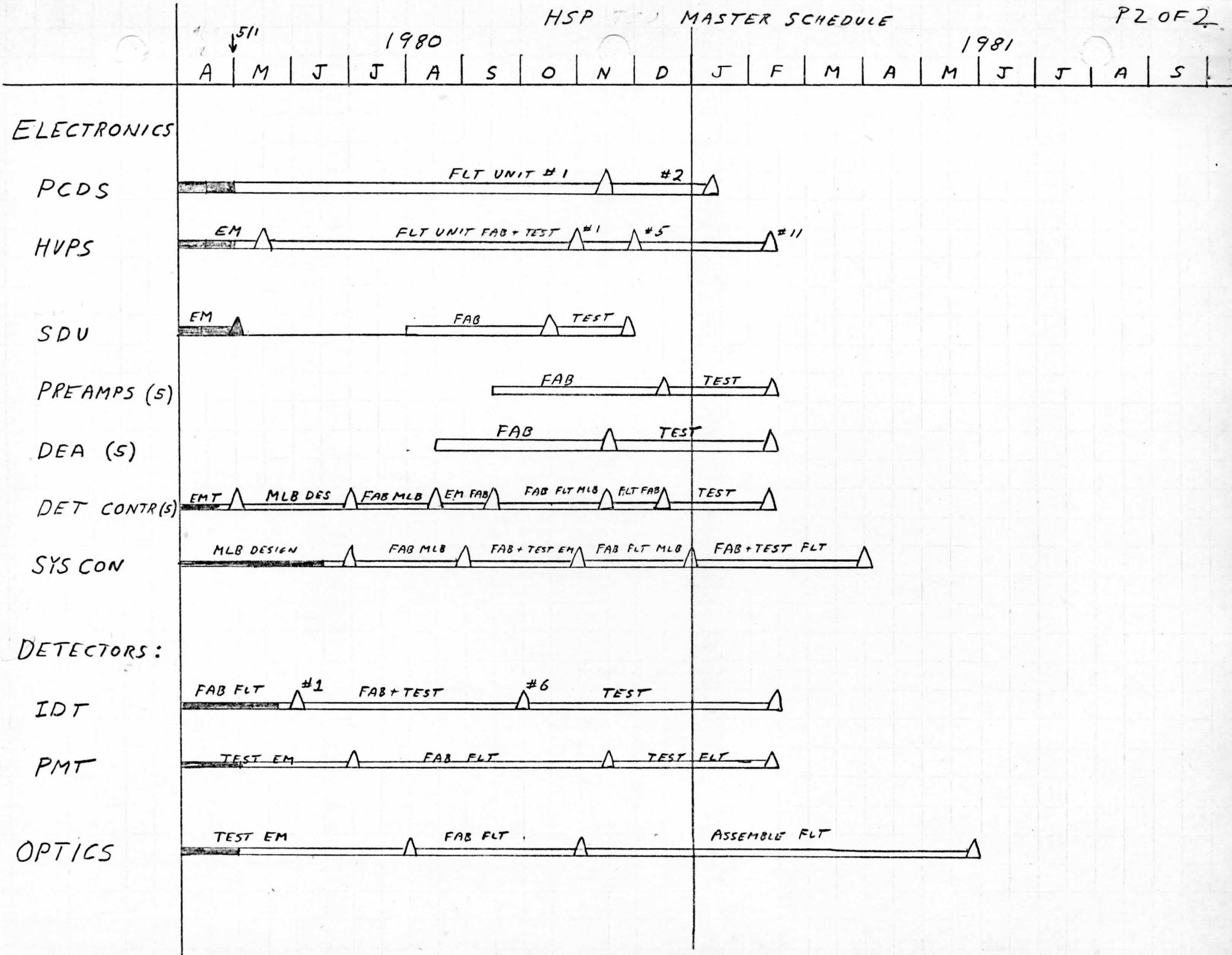
SOFTWARE

8080 S/W — DESIGN / TEST EM — CODE / TEST FLT

FLT (NSSC-1) — PRELIM SDD — SDD

C+DH SIM — DESIGN — CODE — DEBUG

HSP MASTER SCHEDULE



OPTICAL DETECTOR SUBSYSTEM (ODS)

MINIMUM VALUES		INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	1935.	1935.	1852.	5	9673.	9673.	9260.
ICT ASSEMBLY								
DIVIDER		0.	0.	82.	4	0.	0.	330.
FOCUS COIL		0.	0.	937.	4	0.	0.	3748.
HORIZ DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
VERT DEFLECTION COIL		0.	0.	0.	4	0.	0.	0.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL ICT ASSEMBLY		127.	127.	1147.		510.	510.	4588.
PMT ASSEMBLY								
DIVIDER		0.	0.	82.	1	0.	0.	82.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	210.		127.	127.	210.

MINIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 14058.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	9673.
ICT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	9673.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	2026.	2026.	1866.	5	10129.	10129.	9329.
ICT ASSEMBLY								
DIVIDER		0.	0.	160.	4	0.	0.	640.
FOCUS COIL		0.	0.	1177.	4	0.	0.	4708.
HORIZ DEFLECTION COIL		0.	0.	17.	4	0.	0.	68.
VERT DEFLECTION COIL		0.	0.	20.	4	0.	0.	80.
PAD PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL ICT ASSEMBLY		127.	127.	1501.		510.	510.	6006.
PMT ASSEMBLY								
DIVIDER		0.	0.	160.	1	0.	0.	160.
PAD PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	287.		127.	127.	287.

NOMINAL TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 15622.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	10129.
ICT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
DDS TOTAL	300.	337.	0.	0.	0.	0.	10129.

MAXIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
HIGH VOLTAGE SUPPLY (HVPS)	28P	2146.	2146.	1884.	5	10732.	10732.	9419.
ICT ASSEMBLY								
DIVIDER		0.	0.	262.	4	0.	0.	1050.
FOCUS COIL		0.	0.	1665.	4	0.	0.	6660.
HORIZ DEFLECTION COIL		0.	0.	69.	4	0.	0.	276.
VERT DEFLECTION COIL		0.	0.	81.	4	0.	0.	324.
PAC PREAMP	P15T	60.	127.	127.	4	240.	510.	510.
	M15T	67.				270.		
TOTAL ICT ASSEMBLY		127.	127.	2205.		510.	510.	8820.
PMT ASSEMBLY								
DIVIDER		0.	0.	262.	1	0.	0.	262.
PAC PREAMP	P15T	60.	127.	127.	1	60.	127.	127.
	M15T	67.				67.		
TOTAL PMT ASSEMBLY		127.	127.	390.		127.	127.	390.

MAXIMUM TOTALS - OPTICAL DETECTOR SUBSYSTEM TOTAL DISSIPATION 18629.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
HVPS	0.	0.	0.	0.	0.	0.	10732.
ICT ASSEMBLY	240.	270.	0.	0.	0.	0.	0.
PMT ASSEMBLY	60.	67.	0.	0.	0.	0.	0.
ODS TOTAL	300.	337.	0.	0.	0.	0.	10732.

	MINIMUM VALUES	INDIVIDUAL UNIT			TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
ICT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	213.	991.	991.	4	852.	3964.	3964.
	M15T	713.				2852.		
	P5T	65.				260.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	4	27.	232.	232.
	M15T	33.				132.		
	P5T	18.				73.		
FOCUS AMPLIFIER	P15T	1050.	2130.	1193.	4	4200.	8520.	4772.
	M15T	1080.				4320.		
HORIZONTAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
VERTICAL DEFLECTION AMP.	P15T	24.	42.	42.	4	96.	168.	168.
	M15T	18.				72.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL ICT ELECTRONICS		10032.	10032.	9095.		40126.	40126.	36378.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	213.	991.	991.	1	213.	991.	991.
	M15T	713.				713.		
	P5T	65.				65.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	1	7.	58.	58.
	M15T	33.				33.		
	P5T	18.				18.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7818.	7818.	7818.		7818.	7818.	7818.

MINIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 44196.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
ICT ELECTRONICS	8007.	13316.	18803.	0.	0.	0.	0.
PMT ELECTRONICS	904.	2213.	4701.	0.	0.	0.	0.
DEA TOTAL	8911.	15529.	23504.	0.	0.	0.	0.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
IDT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	213.	991.	991.	4	852.	3964.	3964.
	M15T	713.				2852.		
	P5T	65.				260.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	4	27.	232.	232.
	M15T	33.				132.		
	P5T	18.				73.		
FOCUS AMPLIFIER	P15T	1245.	2460.	1283.	4	4980.	9840.	5132.
	M15T	1215.				4860.		
HORIZONTAL DEFLECTION AMP.	P15T	241.	258.	241.	4	963.	1032.	964.
	M15T	17.				69.		
VERTICAL DEFLECTION AMP.	P15T	219.	236.	216.	4	876.	945.	865.
	M15T	17.				69.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL IDT ELECTRONICS		10772.	10772.	9558.		43087.	43087.	38231.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAD)	P15T	213.	991.	991.	1	213.	991.	991.
	M15T	713.				713.		
	P5T	65.				65.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	1	7.	58.	58.
	M15T	33.				33.		
	P5T	18.				18.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7818.	7818.	7818.		7818.	7818.	7818.

NOMINAL TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 46049.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
IDT ELECTRONICS	10434.	13850.	18803.	0.	0.	0.	0.
PMT ELECTRONICS	904.	2213.	4701.	0.	0.	0.	0.
DEA TOTAL	11338.	16063.	23504.	0.	0.	0.	0.

MAXIMUM VALUES		INDIVIDUAL UNIT				TOTAL ALL UNITS		
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
ICT ELECTRONICS								
PULSE AMP. DISCR. (PAC)	P15T	213.	991.	991.	4	852.	3964.	3964.
	M15T	713.				2852.		
	P5T	65.				260.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	4	27.	232.	232.
	M15T	33.				132.		
	P5T	18.				73.		
FOCUS AMPLIFIER	P15T	1425.	2835.	1170.	4	5700.	11340.	4680.
	M15T	1410.				5640.		
HORIZONTAL DEFLECTION AMP.	P15T	374.	390.	321.	4	1496.	1562.	1286.
	M15T	16.				66.		
VERTICAL DEFLECTION AMP.	P15T	404.	420.	339.	4	1616.	1682.	1358.
	M15T	16.				66.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	4	2736.	27074.	27074.
	M15T	1467.				5868.		
	P5T	4617.				18470.		
TOTAL ICT ELECTRONICS		11464.	11464.	9649.		45854.	45854.	38594.
PMT ELECTRONICS								
PULSE AMP. DISCR. (PAC)	P15T	213.	991.	991.	1	213.	991.	991.
	M15T	713.				713.		
	P5T	65.				65.		
CURRENT-VOLTAGE AMP. (CVA)	P15T	7.	58.	58.	1	7.	58.	58.
	M15T	33.				33.		
	P5T	18.				18.		
DETECTOR CONTROLLER	P15T	684.	6768.	6768.	1	684.	6768.	6768.
	M15T	1467.				1467.		
	P5T	4617.				4617.		
TOTAL PMT ELECTRONICS		7818.	7818.	7818.		7818.	7818.	7818.

MAXIMUM TOTALS - DETECTOR ELECTRONICS ASSEMBLY TOTAL DISSIPATION 46412.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
ICT ELECTRONICS	12427.	14624.	18803.	0.	0.	0.	0.
PMT ELECTRONICS	904.	2213.	4701.	0.	0.	0.	0.
DEA TOTAL	13331.	16837.	23504.	0.	0.	0.	0.

MINIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MINIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

NOMINAL VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

NOMINAL TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

MAXIMUM VALUES

	INDIVIDUAL UNIT				TOTAL ALL UNITS			
	POWER SOURCE	SEC.DC POWER	SEC.DC TOTAL	COMP. DISSIP.	NO. OF UNITS	SEC.DC POWER	SEC.DC TOTAL	COMPONENT DISSIPATION
SYSTEM CONTROLLER	P12D	1104.	22849.	22849.	1	1104.	22849.	22849.
	P5D	21720.				21720.		
	M5D	25.				25.		
TOTAL SYSTEM CONTROLLER		22849.	22849.	22849.		22849.	22849.	22849.

MAXIMUM TOTAL - SYSTEM CONTROLLER TOTAL DISSIPATION 22849.

SECONDARY DC UTILIZATION

	P15T	M15T	P5T	P12D	P5D	M5D	28P
SYSTEM CONTROLLER	0.	0.	0.	1104.	21720.	25.	0.

MINIMUM	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	14438.	4279.	10159.	4	57753.	17117.	40636.
DETECTOR SUPPLY (PMT)	12242.	4297.	7945.	1	12242.	4297.	7945.
DIGITAL SUPPLY	41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR	13314.	3641.	9673.	1	13314.	3641.	9673.
TOTAL	81539.	30913.	50626.		124854.	43751.	81103.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	8007.	13316.	18803.		
IDT TOTAL	8247.	13586.	18803.	40636.	57753.
PMT ASSEMELY	60.	67.	0.		
PMT ELECTRONICS	904.	2213.	4701.		
PMT TOTAL	964.	2280.	4701.	7945.	12242.
TOTAL	9211.	15866.	23504.	48581.	68496.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

FREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	9673.	13314.
TOTAL	9673.	13314.

NOMINAL	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	15549.	4649.	10899.	4	62195.	18598.	43597.
DETECTOR SUPPLY (PMT)	12242.	4297.	7945.	1	12242.	4297.	7945.
DIGITAL SUPPLY	41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR	13824.	3695.	10129.	1	13824.	3695.	10129.
TOTAL	83159.	31337.	51822.		129806.	45286.	84520.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMBLY	240.	270.	0.		
IDT ELECTRONICS	10434.	13850.	18803.		
IDT TOTAL	10674.	14120.	18803.	43597.	62195.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	904.	2213.	4701.		
PMT TOTAL	964.	2280.	4701.	7945.	12242.
TOTAL	11638.	16400.	23504.	51542.	72937.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

FREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	10129.	13824.
TOTAL	10129.	13824.

MAXIMUM	INDIVIDUAL UNIT				TOTAL ALL UNITS		
	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER	NO. OF UNITS	S/C BUS POWER INPUT	COMPONENT DISSIP.	TOTAL OUTPUT POWER
DETECTOR SUPPLY (IDT)	16586.	4995.	11591.	4	66345.	19981.	46364.
DETECTOR SUPPLY (PMT)	12242.	4297.	7945.	1	12242.	4297.	7945.
DIGITAL SUPPLY	41544.	18695.	22849.	1	41544.	18695.	22849.
PREREGULATOR	14498.	3766.	10732.	1	14498.	3766.	10732.
TOTAL	84871.	31754.	53117.		134630.	46740.	87890.

POWER SUPPLY LOAD DISTRIBUTION

DETECTOR SUPPLY LOADS

	P15T	M15T	P5T	TOTAL OUTPUT	S/C BUS POWER
IDT ASSEMELY	240.	270.	0.		
IDT ELECTRONICS	12427.	14624.	18803.		
IDT TOTAL	12667.	14894.	18803.	46364.	66345.
PMT ASSEMBLY	60.	67.	0.		
PMT ELECTRONICS	904.	2213.	4701.		
PMT TOTAL	964.	2280.	4701.	7945.	12242.
TOTAL	13631.	17174.	23504.	54309.	77088.

DIGITAL SUPPLY LOADS

	P12D	P5D	M5D	TOTAL OUTPUT	S/C BUS POWER
SYSTEM CONTROLLER	1104.	21720.	25.	22849.	41544.
TOTAL	1104.	21720.	25.	22849.	41544.

FREREGULATOR LOADS

	28P	S/C BUS POWER
HIGH VOLTAGE SUPPLY	10732.	14498.
TOTAL	10732.	14498.

	MINIMUM	NOMINAL	MAXIMUM
HSP (LESS RIU) POWER INPUT	124854.	129806.	134630.
CDS	14058.	15622.	18629.
DETECTOR ELECTRONICS	44196.	46049.	46412.
SYSTEM CONTROLLER	22849.	22849.	22849.
PCDS	43751.	45286.	46740.
SUBASSEMBLY TOTALS	124854.	129806.	134630.

NOMINAL POWER FOR VARIOUS OPERATING MODES (NOT INCLUDING RIU/EU)

COMMON ELECTRONICS	41544.
ICT DETECTOR	18314.
PMT DETECTOR	15007.

CONTINGENCY

ALLOWABLE SI POWER	145000.
LESS AM/EL POWER	5000.
ALLOWABLE HSP POWER	140000.
PRESENT HSP POWER	129806.

CONTINGENCY (140000/129806.-1)*100= 7.85 PERCENT
(NOTE: THIS CONTINGENCY IS BASED ON ALL FIVE DETECTORS OPERATING)

CHANGES FROM THE PREVIOUS BUDGET (NOMINAL VALUES ONLY)

ITEM	POWER SOURCE	WAS	IS	INCREASE	S/C BUS POWER INCREASE
HVPS	28P	10129.	10129.	-0.	0.
PREAMP	P15T	300.	300.	0.	0.
	M15T	337.	337.	0.	
PAD	P15T	1125.	1065.	-60.	440.
	M15T	3262.	3565.	302.	
	P5T	262.	325.	63.	
C-V AMPLIFIER	P15T	105.	34.	-71.	32.
	M15T	34.	165.	131.	
	P5T	137.	91.	-46.	
FOCUS AMP.	P15T	4680.	4980.	300.	450.
	M15T	4860.	4860.	0.	
DEFLECTION AMP.	P15T	1839.	1839.	0.	0.
	M15T	138.	138.	0.	
DET. CONTROLLER	P15T	3420.	3420.	0.	0.
	M15T	7335.	7335.	0.	
	P5T	23087.	23087.	0.	
SYSTEM CONTROLLER	P12D	1104.	1104.	0.	0.
	P5C	21720.	21720.	0.	
	M5D	25.	25.	0.	
				TOTAL	923.
				BUS POWER INCREASE	-924.
				PREVIOUS BUS POWER	128881.
				PRESENT BUS POWER	129806.

PCDS HEATER AND TEST LAMP LOADS (NOT INCLUDED IN THE FSP POWER BUDGET TOTALS)

	INCREMENTAL BUS POWER INPUT	SUPPLY COMPONENT DISSIP.	TOTAL OUTPUT POWER
PRERECULATOR			
CDS HEATER 1	1677.	177.	1500.
CDS HEATER 2	3298.	348.	2950.
CDS HEATER 3	6328.	668.	5660.
S/C INPUT BUS			
FORWARD HEATER 1	4000.		4000.
FORWARD HEATER 2	12000.		12000.
FORWARD HEATER 3	16000.		16000.
AFT HEATER 1	6000.		6000.
AFT HEATER 2	18000.		18000.
AFT HEATER 3	24000.		24000.
DIGITAL SUPPLY			
TEST LAMPS	2001.	851.	1150.

NOTES:

1. ALL POWER GIVEN IN MILLIWATTS

2. MINIMUM, NOMINAL, AND MAXIMUM VALUES ARE BASED ON OPERATING MODES OF TYPICAL UNITS ONLY. THEY DO NOT INCLUDE UNIT TO UNIT VARIATIONS.

3. OPERATING CONDITIONS, WITH ALL DETECTORS SIMULTANEOUSLY POWERED WILL BE SUCH THAT THE TOTAL POWER CONSUMPTION WILL RARELY EXCEED THE NOMINAL VALUES IN THE BUDGET

4. POWER SUPPLY EFFICIENCY EQUATIONS USED IN THIS BUDGET ARE AS FOLLOWS:

   DETECTOR SUPPLY: S/C BUS POWER=

   1500.00+ 1.50*(+15 VOLT POWER)+ 1.50*(-15 VOLT POWER)+ 1.25*(+5 VOLT POWER)

   DIGITAL SUPPLY: S/C BUS POWER=

   2000.00+ 1.56*(+12 VOLT POWER)+ 1.74*(+5 VOLT POWER)+ 1.25*(-5 VOLT POWER)

   PREREGULATOR: S/C BUS POWER=

   2500.00+ 1.12*(+28 VOLT POWER)

D. Johnson

DR-MA-02 Number 26
Issued: June 6, 1980

Monthly Report

for

May 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.AccountNo.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

TSU tests began in May at GSFC. The CG measurement confirmed predictions, and measured stresses during acceleration tests were slightly below model predictions. Delays were encountered toward the end of the month which threaten the present schedule for completion of the tests. Tests planned for June are dynamic linearity, modal survey, acoustics, and preparation and start of thermal vacuum.

The system controller multilayer board design was reviewed in May, changes were made, and revised pen plots are expected in early June. Production of the engineering model boards is now expected to begin by mid-June. The schematic diagram for the detector controller is being revised to incorporate recent changes that were made to correct some problems found during engineering model testing. Design of the detector controller multilayer board will begin in June.

Testing of the engineering model image dissector tube assembly (IDA) continued in May. Difficulties with the engineering model detector electronics and interconnect wiring have delayed completion of the tests until mid-June. Test results to date have been satisfactory. Tests of the first flight IDA will begin later in June when engineering model IDA tests are complete. The second flight unit was in acceptance tests at ITT at the end of May and is expected to be delivered in June.

Integration of the engineering model (spruce goose) continued in May at a somewhat slower pace than expected due to problems discovered in one of the two RIU's. There were also several discrepancies in the PCDS which will be repaired in early June. None of the problems is major. Integration of the system controller is expected to be completed in June and attention will then focus on integration of the detector electronics.

Work continues on GSE #2 while GSE #1 is supporting engineering model integration. GSE #2 is nearly complete except for cables.

As of June 1 there were seven out of two hundred and twelve line items of flight electronics parts not received. All remaining parts are scheduled to be delivered by July 1. Connector deliveries (not included in the above two hundred and twelve items) are later in July.

Flight unit structural/mechanical fabrication has begun and all remaining mechanical GSE and flight unit material is being ordered. Assembly of the box beam has been delayed pending results of the blind rivet investigation (see problem areas, Section C).

Correction of the HVPS problems required extensive redesign during May. Most of the problems have been identified and are easily corrected. A schedule for incorporating the changes into the engineering model HVPS and retesting will be established in June.

There are no changes in either the power or weight budget of the HSP.

B. Schedule

Planning for the CDR continues on the assumption that it will be held after completion of TSU tests, or August 26/27, 1980. TSU tests were approximately one week behind schedule as of the end of May. CDR could be impacted if the schedule is not recovered.

A software schedule is attached showing all software deliveries and some additional key milestones.

C. Problem Areas

The HVPS is an item of major concern. It was necessary to redesign the HVPS to correct performance and reliability problems. We are presently assisting the subcontractor in the redesign effort and are working toward establishment of a revised schedule. Major delivery impact on flight units is not expected.

The blind rivets used to assemble the TSU were recently found to have lubricants which may not be acceptable from a materials outgassing standpoint. An investigation is continuing on possible alternatives or the establishment of an acceptable cleaning method. Assembly of the flight unit box beam is being delayed until more information has been collected.

D. Science Section

The next meeting of the investigations definition team will be at GSFC on June 19. Major topics will be TSU test status and HSP filters.

E. Documentation Section

No change.

F. CCB Activity

C&DH ICD PIRNs	ACTION	
017A	5/27	Approved with no impact.
029A	5/27	Approved with no impact.
030	5/27	Approved with no impact if approved by 6/9-10 IFWG.
031-35	5/27	Approved with no impact if approved by IFWG 6/9-10.
036	5/27	Additional paragraph requested for IFWG 6/9-10 review.
037-38	5/27	Approved with no impact.

F. CCB Activity, continued.

C&DH ICD PIRNs	ACTION
042A, 043-51	Received 5/28.
018A	Received 6/2.
036A	Received 6/2.
039A	Received 6/2.
042B	Received 6/2.
043A	Received 6/2.
045A	Received 6/2.
052	Received 6/2.

SI-OTA/SSM ICD PIRNs	
2102	5/12 Approved by HSP RECP 0007.

STR-02 PSCNs	
26R1	5/12 Approved by HSP RECP 0007.

T.D.s	
010	5/2 Approved.

HSP MASTER SCHEDULE

6/1

1980: A M J J A S O N D

1981: J F M A M J J A S

STRUCTURE:

TSU TESTS: STRUCT — TV — CDR

PFU ASSY: BOX BEAM — EPB/BULK — ODS / CONO / SKINS

MGSE: DESIGN *SIM I/F — FAB PFU DOLLY — FAB PFU SHIPPING CONTAINER

INTEGRATION + TEST: INST W/H — INT + TEST — TEST. — CALIBRATE — SHIP TO GSFC

GSE: UNIT 1 T — #2F — #2T.

ENGR MODEL: ASSY — TEST — TEST SIM S/W

DOCUMENTATION: CDR PKG

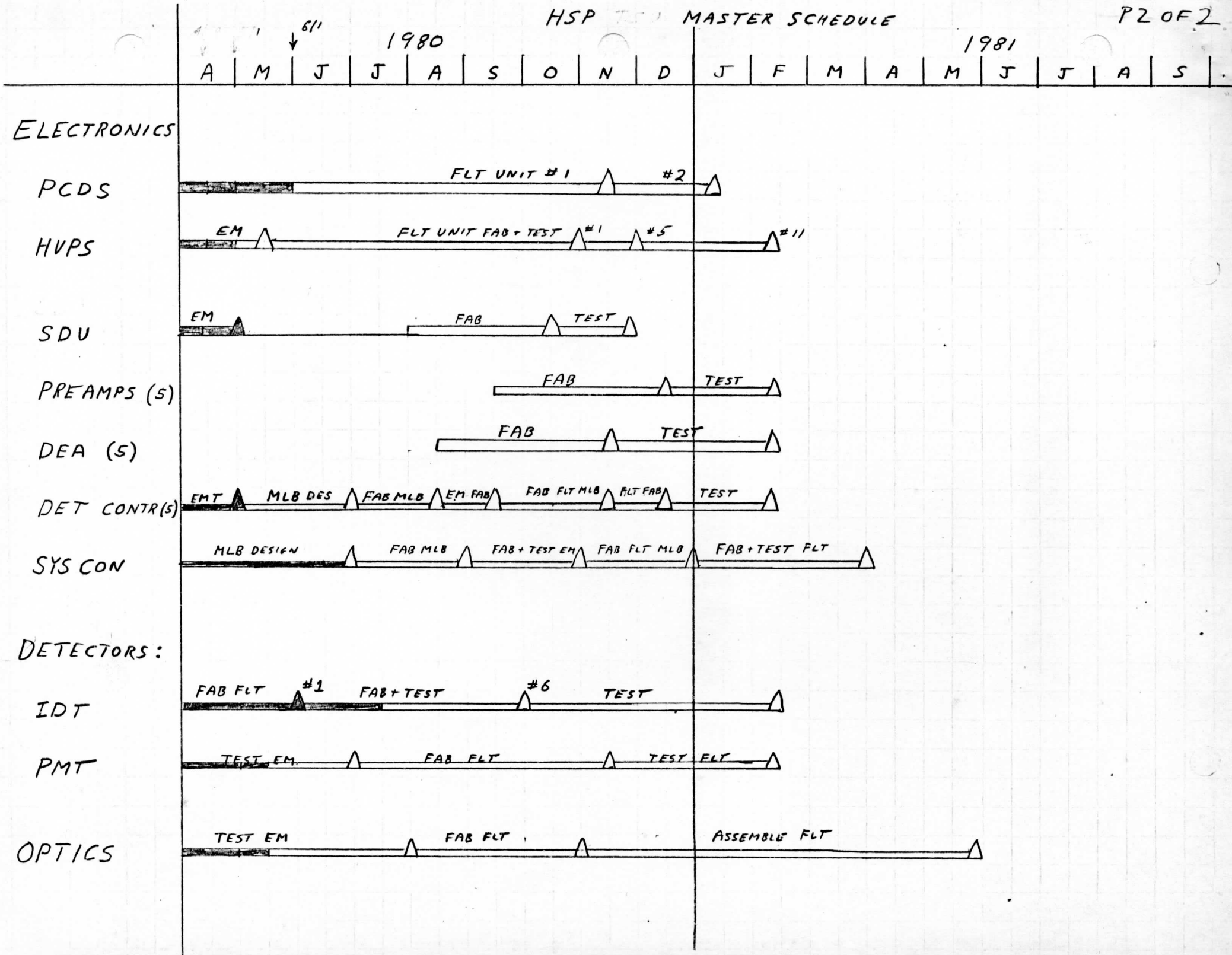
SOFTWARE

8080 S/W: DESIGN / TEST EM — CODE / TEST FLT

FLT (NSSC-1): PRELIM SDD — SDD

C+DH SIM: DESIGN — CODE — DEBUG

HSP MASTER SCHEDULE



HSP SOFTWARE MILESTONES

X031 Flight Software (NSSC-1)

SRD Update		6-1-80
PDL/SDD	P	6-1-80
	U	10-1-80
	U	2-1-81
	F	9-1-81
Code	P	10-1-80
	U	1-1-81
	U	4-1-81
	F	11-15-81
User's Manual		11-15-81

X034 Instrument Firmware

PROM	10-1-80
PDL-F	11-15-81
User's Manual	11-15-81

X035 HSP GSE Software

PDL	7-1-80
Code	7-15-80
User's Manual (CM-03)	8-1-80

X032 Simulator Software

PDL/SDD	P	10-1-80
	U	3-1-81
	F	11-15-81
Code	P	10-1-80
	U	3-1-81
	F	11-15-81
	U	11-1-82

X033 Ground Data Mgmt

All PDL, Code, Manual	F	1-31-83

Real Time

SRD	8-1-80
SDD (PDL)	11-1-80 (P) 3-1-81 (U)
Code	6-1-81

Quick Look

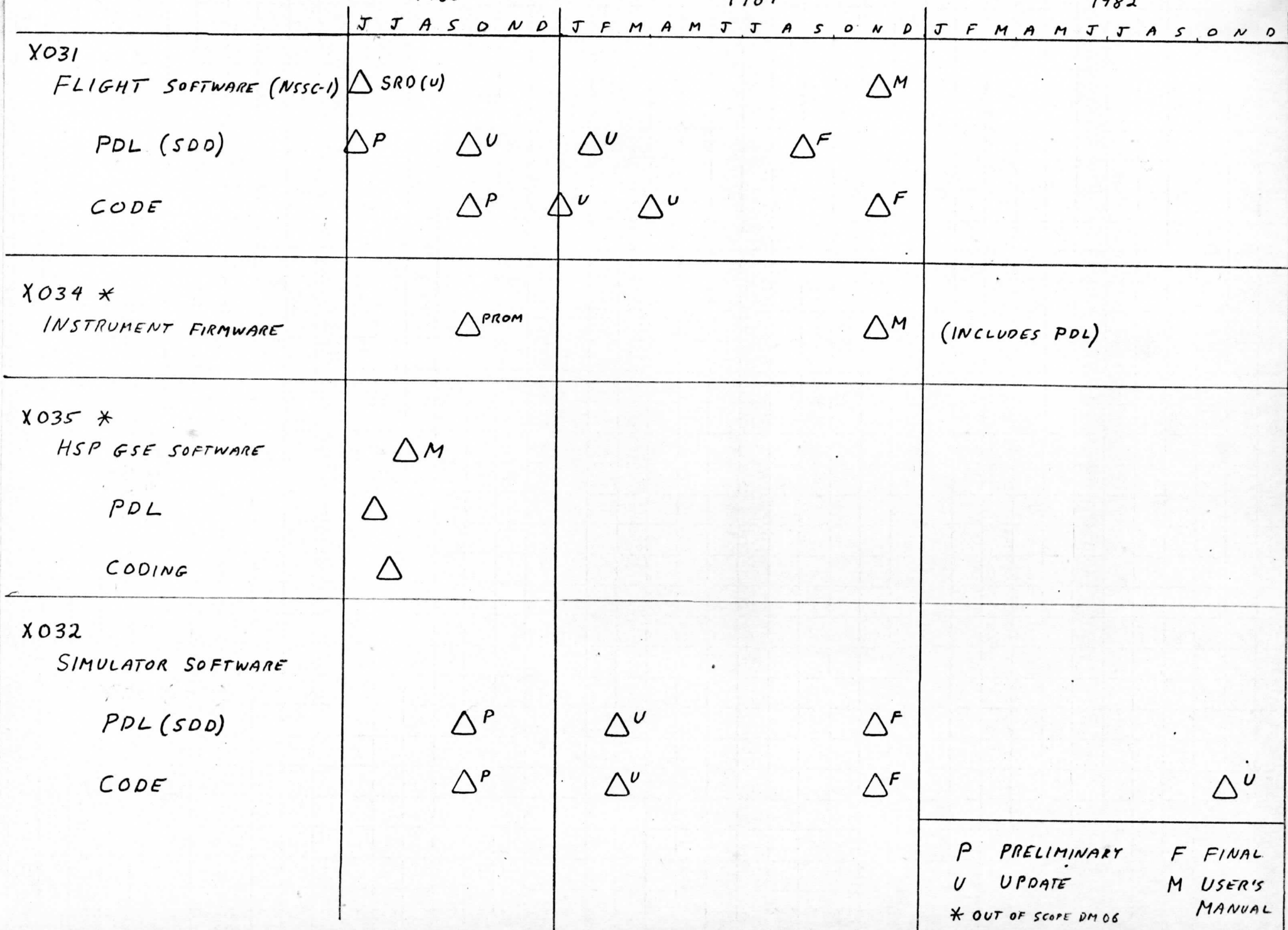
SRD	3-1-81
SDD (PDL)	8-1-81 (P) 12-1-81 (U)
Code	4-1-82

Analysis/Calibration

SRD	1-1-82
SDD (PDL)	5-1-82 (P) 9-1-82 (U)
Code	1-31-83

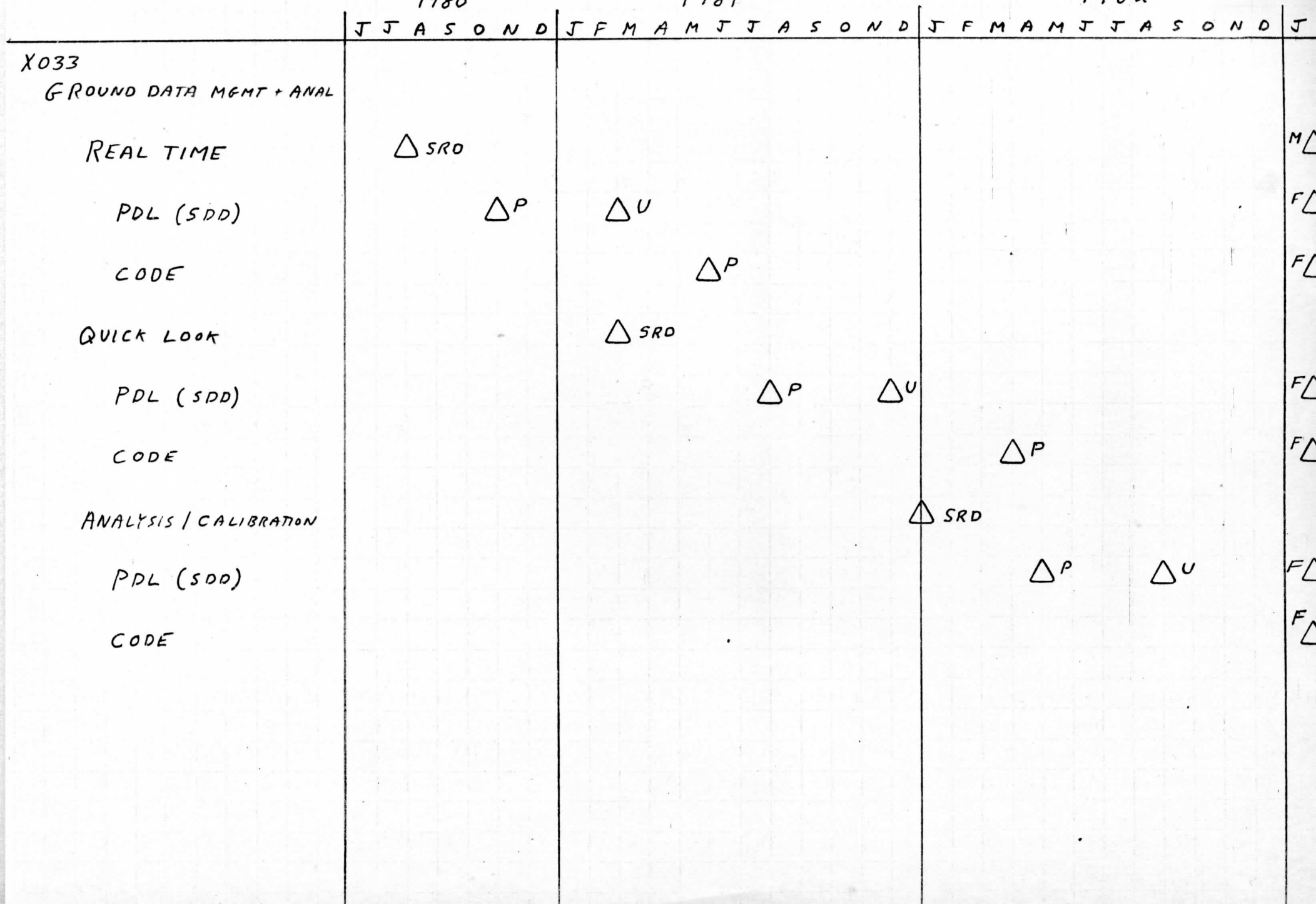
6/1/8

HSP SOFTWARE SCHEDULE



6/1/80

HSP SOFTWARE SCHEDULE



Who is the next Space Telescope Briefing

Don Johnson file

DR-MA-02 Number 27
including SE-02
Issued: 3 July 1980

Monthly Report

for

June 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Structural tests of the HSP TSU were completed in May at GSFC. Dynamic linearity, modal survey, and acoustic tests were performed and the TSU was instrumented for thermal vacuum tests. Results of all tests confirm modal predictions with minor exceptions. One predicted mode was not confirmed in the modal survey, but the astronaut handle supports, which are not included in the NASTRAN model, will be added, the model run again and checked with test results. The acoustic test (143 db overall) caused no detectable damage or degradation and measured vibration levels were within expectations. The thermal vacuum test is scheduled to be completed in late July.

Integration of the engineering model continued to be slowed by numerous PCDS problems. Most of the problems were minor (wires on wrong pins, spurious ground connections, etc) and easily corrected. By the end of the month the integration of the system controller was well along and expected to be completed in early July. Integration of the detector electronics is expected to proceed with fewer problems because of the previous integration of a set of engineering model detector electronics.

Testing of the engineering model image dissector tube (IDT) was not completed in June because the key personnel were required on another program. Testing is expected to resume in July. The second flight unit IDT was delivered in June. Two more are expected in July, one of which will be the first flight UV tube. The final two flight tubes are expected in August.

Integration of the engineering model PCDS uncovered several minor problems which require some redesign of the flight unit to preclude recurrence. A review meeting will be held when all redesign has been completed prior to beginning fabrication of the flight units.

The high voltage power supply redesign effort has been completed, breadboarded, and tested. A new engineering model is scheduled to be complete and ready to test in early August.

The prototype multilayer board for the system controller is now being fabricated. The detector controller multilayer board design has begun. All but four flight electronics parts line items have been received.

Fabrication of the flight unit forward bulkhead will begin in July. The aft bulkhead was completed in June. The electronics baseplate is now being machined and will be complete in July. Box beam parts have been made and irridited. The solution to the rivet problem reported last month, subject to confirmation of outgassing test results, is to remove the manufacturer's lubricant by cleaning in alcohol, then relubricating with one small drop of Bray oil. The finished rivet is then flushed after assembly to remove any excess external oil. Assembly of the box beam will begin in July.

The power budget remains unchanged from the last report.

DR-SE-02: The HSP mass properties report is unchanged from previously reported values.

B. Schedule

A firm CDR date has not been established, but is expected to be either the week of August 18 or 25. An internal review is planned for July 23 and 24 with all team members present. Revised schedules are attached.

C. Problem Areas

The HVPS problem reported last month has been corrected by redesign and an engineering model is expected to be ready for test by August 1. The major remaining problem will be to ensure that all required parts are received in time to support flight unit HVPS fabrication schedules.

D. Science Section

Dan Schroeder has investigated the theoretical properties of single and double 5 layer MgF_2/Al and MgF_2/Ag interference filters for the UV and visual. The motivation for this work was the HSP need for broad band filters in the visual and red spectral regions which would have the same optical thicknesses as UV interference filters, and our desire for near UV filters with the smallest red leaks possible. Both needs can, in principle, be satisfied and this summer we will attempt to manufacture at SAL several of the more interesting possibilities. This information has also been sent to Jim Westphal who may find the low red leak filters especially useful.

A team meeting was held at Goddard on June 19. The major topics discussed were the status of TSU testing and engineering model development, and the HSP filter list. The major remaining uncertainties in the filter complement will be resolved in a few months after we determine the characteristics of the filters we manufacture this summer.

E. Documentation

No change.

F. CCB Activity

STR-02 PSCN's	Action
37	Received 6/17
38	Approved 6/16
40	Approved 6/27

SI-OTA/SSM ICD PIRN's	
2105	Approved 6/27

HSP MASTER SCHEDULE

7/1

1980 | 1981

A M J J A S O N D J F M A M J J A S

STRUCTURE:

TSU TESTS — STRUCT — TV — CDR

PFU ASSY — BOX BEAM — EPB/BULK — ODS / CONO / SKINS

MGSE — DESIGN *SIM I/F — FAB PFU DOLLY — FAB PFU SHIPPING CONTAINER

INTEGRATION + TEST — INST W/H — INT + TEST — TEST — CALIBRATE — SHIP TO GSFC

GSE — UNIT 1 T — #2 F — #2 T

ENGR MODEL — ASSY — TEST — TEST SIM S/W

DOCUMENTATION — CDR PKG

SOFTWARE

8080 S/W — DESIGN / TEST EM — CODE / TEST FLT

FLT (NSSC-1) — PRELIM SDD — SDD

C+DH SIM — DESIGN — CODE — DEBUG

HSP MASTER SCHEDULE

7/1

1980 | 1981

A M J J A S O N D J F M A M J J A S

ELECTRONICS

PCDS — FLT UNIT #1 — #2

HVPS — EM — FLT UNIT FAB + TEST — #1 — #5 — #11

SDU — EM — FAB — TEST

PREAMPS (5) — FAB — TEST

DEA (5) — FAB — TEST

DET CONTR(5) — EMT — MLB DES — FAB MLB — EM FAB — FAB FLT MLB — FLT FAB — TEST

SYS CON — MLB DESIGN — FAB MLB — FAB + TEST EM — FAB FLT MLB — FAB + TEST FLT

DETECTORS:

IDT — FAB FLT — #1 — FAB + TEST — #6 — TEST

PMT — TEST EM — FAB FLT — TEST FLT

OPTICS — TEST EM — FAB FLT — ASSEMBLE FLT

HSP SOFTWARE MILESTONES

X031 Flight Software (NSSC-1)

SRD Update		6-1-80
PDL/SDD	P	6-1-80
	U	10-1-80
	U	2-1-81
	F	9-1-81
Code	P	10-1-80
	U	1-1-81
	U	4-1-81
	F	11-15-81
User's Manual		11-15-81

X034 Instrument Firmware

	PROM	10-1-80
	PDL-F	11-15-81
	User's Manual	11-15-81

X035 HSP GSE Software

PDL		7-1-80
Code		7-15-80
User's Manual (CM-03)		8-1-80

X032 Simulator Software

PDL/SDD	P	10-1-80
	U	3-1-81
	F	11-15-81
Code	P	10-1-80
	U	3-1-81
	F	11-15-81
	U	11-1-82

X033 Ground Data Mgmt

All PDL, Code, Manual	F	1-31-83

Real Time

SRD	8-1-80
SDD (PDL)	11-1-80 (P) 3-1-81 (U)
Code	6-1-81

Quick Look

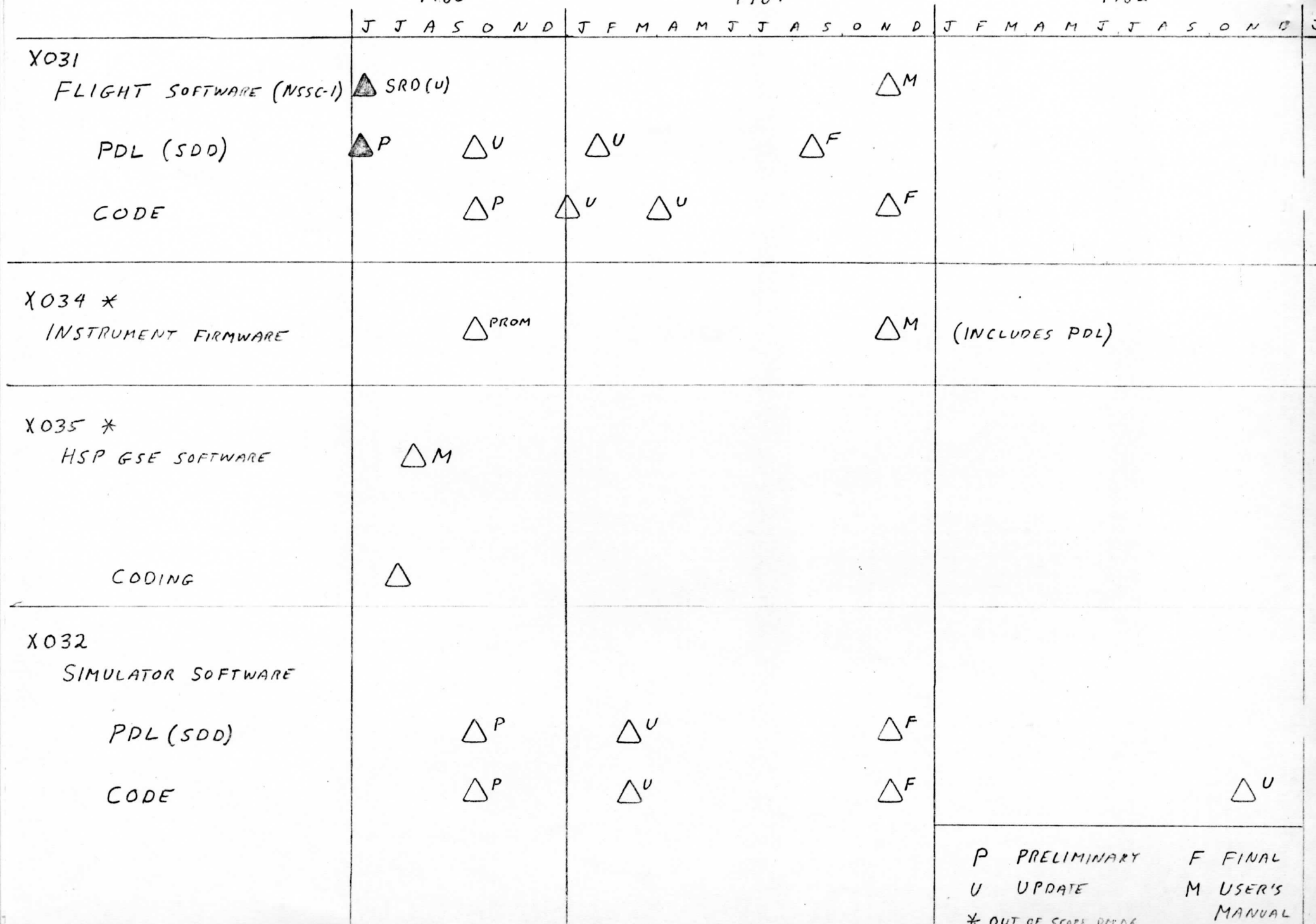
SRD	3-1-81
SDD (PDL)	8-1-81 (P) 12-1-81 (U)
Code	4-1-82

Analysis/Calibration

SRD	1-1-82
SDD (PDL)	5-1-82 (P) 9-1-82 (U)
Code	1-31-83

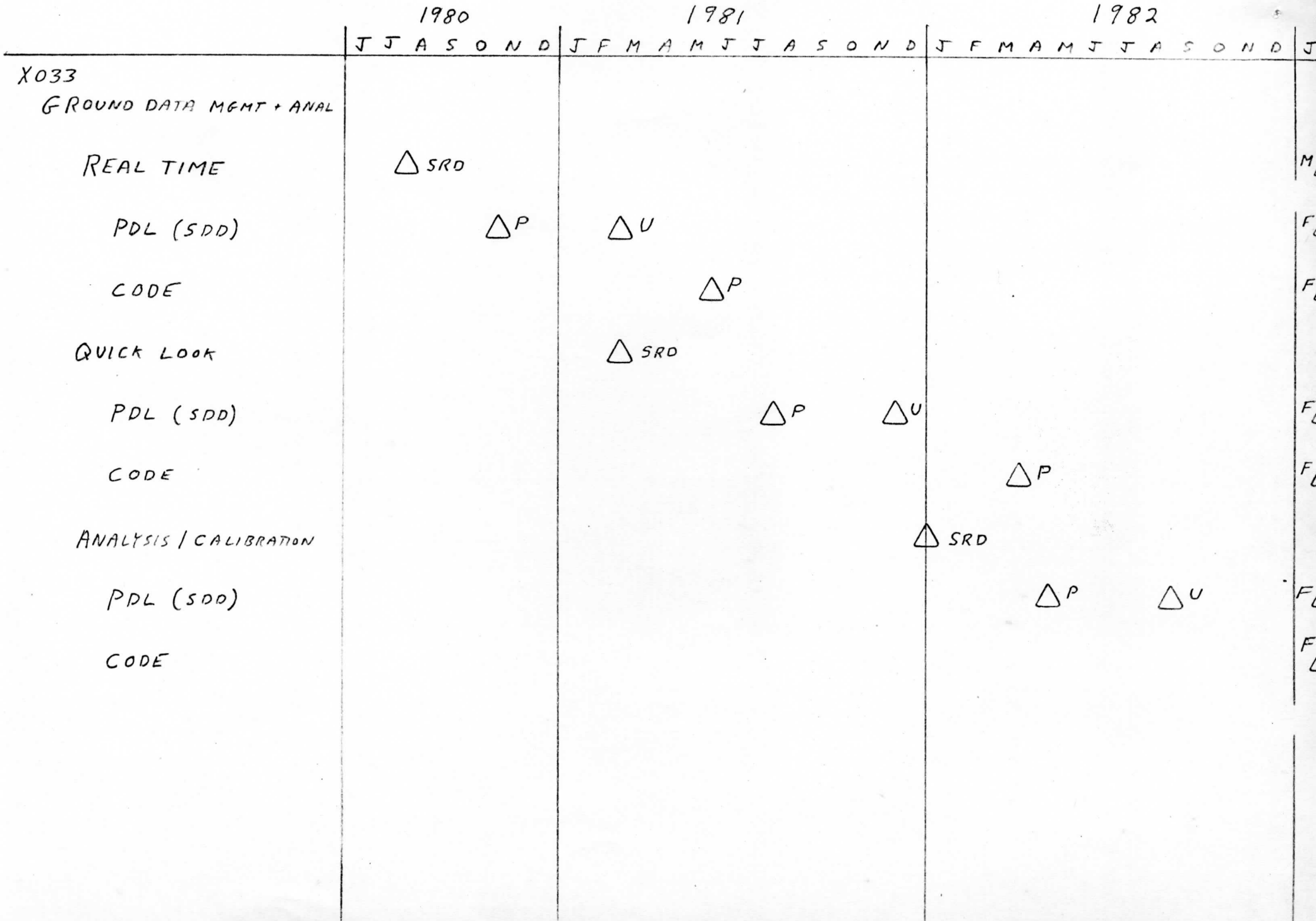
7/1/80

HSP SOFTWARE SCHEDULE



7/1/80

HSP SOFTWARE SCHEDULE



Don Johnson

DR-MA-02 Number 28
including SE-02
Issued: 5 August 1980

Monthly Report

for

July 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The TSU thermal vacuum test was completed in mid month. The results verify that the thermal design meets requirements and generally agrees with the thermal model prediction. The only area of significant disparity between the model and test results was in the forward and aft bulkheads and adjacent SI surfaces, which ran colder than predicted by the model. The only out of specification point was the center of one adjacent SI panel, which was -20.7°C in cold hold. This is not considered a problem because the average temperature of the panel is greater than -20.0°C, and the heat loss from the OTA would not exceed that due to a uniform -20°C. The reasons for the lower than predicted temperatures are greater than predicted conductive coupling between the bulkheads and the rest of the HSP structure and less than predicted radiated heat from the FPS. The thermal model used an $\varepsilon^* = 0.05$ for FPS MLI surfaces, which resulted in several watts being radiated to the adjacent SI surfaces. A more typical ε^* for MLI would be in the range 0.005 to 0.01, which would reduce the radiated power to a fraction of a watt. This in turn lowers the temperature of the adjacent SI panel. Several design modifications are being investigated that would increase these interface temperatures. One or more may be incorporated into the flight unit if little or no cost or schedule impact results.

Integration of the engineering model electronics continued in July. By the end of the month the detector controller had been connected and simulated data transferred. The complete engineering model is expected to be integrated by mid August.

Testing of the engineering model image dissector tube resumed in July. Dark count is less sensitive to temperature than expected. Gain has a greater temperature dependence than expected, but test equipment or method problems are suspected. Testing will continue in August. Two more flight tubes were received from ITT in July. The final two are expected in August. It is planned to have one UV tube tested by the end of August in addition to the completion of engineering model (visual) tests.

The mechanical design of the PMT package was completed in July and a dummy tube was potted to verify the package design and vacuum potting technique. During August it is planned to pot another operable reject tube and vibration test the assembly.

Several design changes have been made to the PCDS to correct the problems found in the engineering model. A review is planned shortly prior to committing to flight model production.

The engineering model high voltage power supply was ready for pre-pot tests at the end of the month. The unit will be potted and tested during August.

Detector controller multilayer board design continued in July. A review is planned for August prior to production of prototype boards. The system controller prototype boards are due in August. The single- and double-sided flight PC boards were ordered in July.

Assembly of the flight unit structure began in July. The aft bulkhead and electronics base plate were also completed.

The power and weight budgets remain unchanged from the previous report. A corrected copy of a portion of the HSP mass properties report of May 2, 1980 is attached. The May 2, 1980 report incorrectly stated the TSU weight in several places. The correct TSU weight is 551.01 pounds as shown on the attached corrections.

B. Schedule

CDR has been scheduled for August 27 and 28 at Goddard Space Flight Center, building 21, room 183. A revised schedule is attached. The format was recently adopted by GSFC for HSP schedule monitoring and reporting.

C. Problem Areas

There are no major problems to report. There are numerous minor problems, especially in the parts and materials procurement area, but none pose a major schedule threat at this time.

D. Science Section

Filter manufacturing has begun. Transmission has improved as the technique is refined and further improvements are expected. A major activity during the month was analyzing the TSU, EM and IDT test data to determine the HSP error budget and to verify CEI performance. Results will be presented at CDR.

E. Documentation

The attached tables show the status of all DR's as of August 1, 1980.

F. CCB Activity

STR-02 PSCN's	Action
29R3	Approved 7/3 by HSP RECP 0009
34	Approved 7/15 by HSP RECP 0010
37	Approved 7/3 by HSP RECP 0008

SI-OTA/SSM ICD PIRN's	Action
2106	Approved 7/3
2107	Approved 7/29

SI-SI C&DH ICD PIRN's	Action
57	Approved 7/10

Appendix A - HSP Weight Budget and Mass Properties Report

The actual measured weight of the HSP TSU at GSFC is 551.01 lb. Table 1 (HSP TSU/PFU Weight Comparison) shows the changes in each item expected between the TSU and the PFU. The reasons for these changes are as follows:

Item 4	The forward guiderail interfaces have been fabricated and weighed at GSFC. The actual weight of the parts is 3.87 lb. The remaining 0.13 lb is allowance for fasteners.
Items 15,17,18	The flight unit will be built with G-10 fiberglass from a vendor other than that used for the TSU. The flight fiberglass has a greater density. The PFU weight is calculated from the TSU measured weight of the parts adjusted for the change in material density.
Item 19	The cable harness weight has been calculated in detail using a complete wire harness connection list to determine the total quantity of each wire type. The wire weight has been measured. Connectors have been measured and allowance made for ties, clamps, etc. The TSU contains no wire harness.
Item 21	The DEA TSU boxes are heavier than the latest PFU DEA weight estimate which is based on: -- actual flight configuration (engineering model) analog electronics and structure -- calculated digital electronics weight based on wire-wrap engineering model and previous program multilayer board measured weights.
Item 25	The RIU specification weight (C&DH ICD) has increased from the weight of the actual RIU TSU.
Items 26,27	These items account for hardware not on the TSU: bulkhead heaters, aperture plate assemblies, filters, ODS connector brackets, etc.

The "PFU weight" column of Table 1 is the weight shown in the HSP weight budget, Table 2, in the "present weight" column. The numbers in the "change" column represent changes from the last reported weight budget and are not the changes between TSU and PFU shown in Table 1. The design maturity code for each element has been reviewed and is appropriate.

Figure 1, HSP Weight History, is based on our records of predicted and calculated weight as reported in the HSP monthly report.

Tables 3 and 4 summarize the mass properties of the TSU and PFU.

Corrected 8/5/80

Table 1
HSP TSU/PFU Weight Comparison
April 1980

	Part	TSU Wgt	PFU Wgt	PFU Wgt	Comments
1.	Main Spar	52.5	0.0	52.5	
2.	Electronics Baseplate (EBP)	38.0	0.0	38.0	
3.	Main Spar/EBP Interface	4.3	0.0	4.3	
4.	Forward Bulkhead	44.5	4.0	48.5	Forward guiderail interface not in TSU
5.	Aft Bulkhead	29.0	0.0	29.0	
6.	Interior Bulkheads (8)	32.4	0.0	32.4	
7.	Free Cnr Bulkhead Ties	5.4	0.0	5.4	
8.	Outside Skin	57.0	0.0	57.0	
9.	Electrical Conn Plate	3.3	0.0	3.3	
10.	Forward Reg. Fitting	6.8	0.0	6.8	
11.	Aft Reg. Fitting	11.1	0.0	11.1	
12.	GSE Brackets (6)	17.5	0.0	17.5	
13.	Crewman Handhold Brackets	15.5	0.0	15.5	
14.	Conductor Panels,Angles (2)	33.1	0.0	33.1	
15.	Longit.Fiberglass Angles(6)	6.16	2.74	8.90	Reflects 30.8% less density of Distributec G-10 fiberglass
16.	Longit.Aluminum Angles (3)	2.50	0.0	2.50	

17.	Conductor Panel Bulkhds (6)	5.20	2.30	7.50	" " " "
18.	ODS Closeout Bulkhds (3)	6.0	1.00	7.00	" " " " (Not full weight is fiberglass)
19.	Cable Harness	0.0	26.00	26.0	
20.	Fasteners and Brackets	18.12	0.0	18.12	Calculated from subracting the known TSU weights of this table from the GSFC-measure TSU weight (551.01).
21.	DEA's for IDT's and PMT(5)	39.5	-7.0	32.5	Reflects new best estimate
22.	System Controller	15.0	0.0	15.0	
23.	PCDS	33.0	0.0	33.0	
24.	SDU	3.0	0.0	3.0	
25.	RIU (2) and EU	10.7	1.0	11.7	Reflects RIU spec. weight change
26.	Heaters	0.0	2.0	2.0	No real PFU heater mass in TSU
27.	ODS	61.43	8.57	70.0	No aperture, IDT shim plates, cable, connector bracket, etc in TSU (61.43 is ODS subassembly weight and interface channels).
		551.01		591.62	

2 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

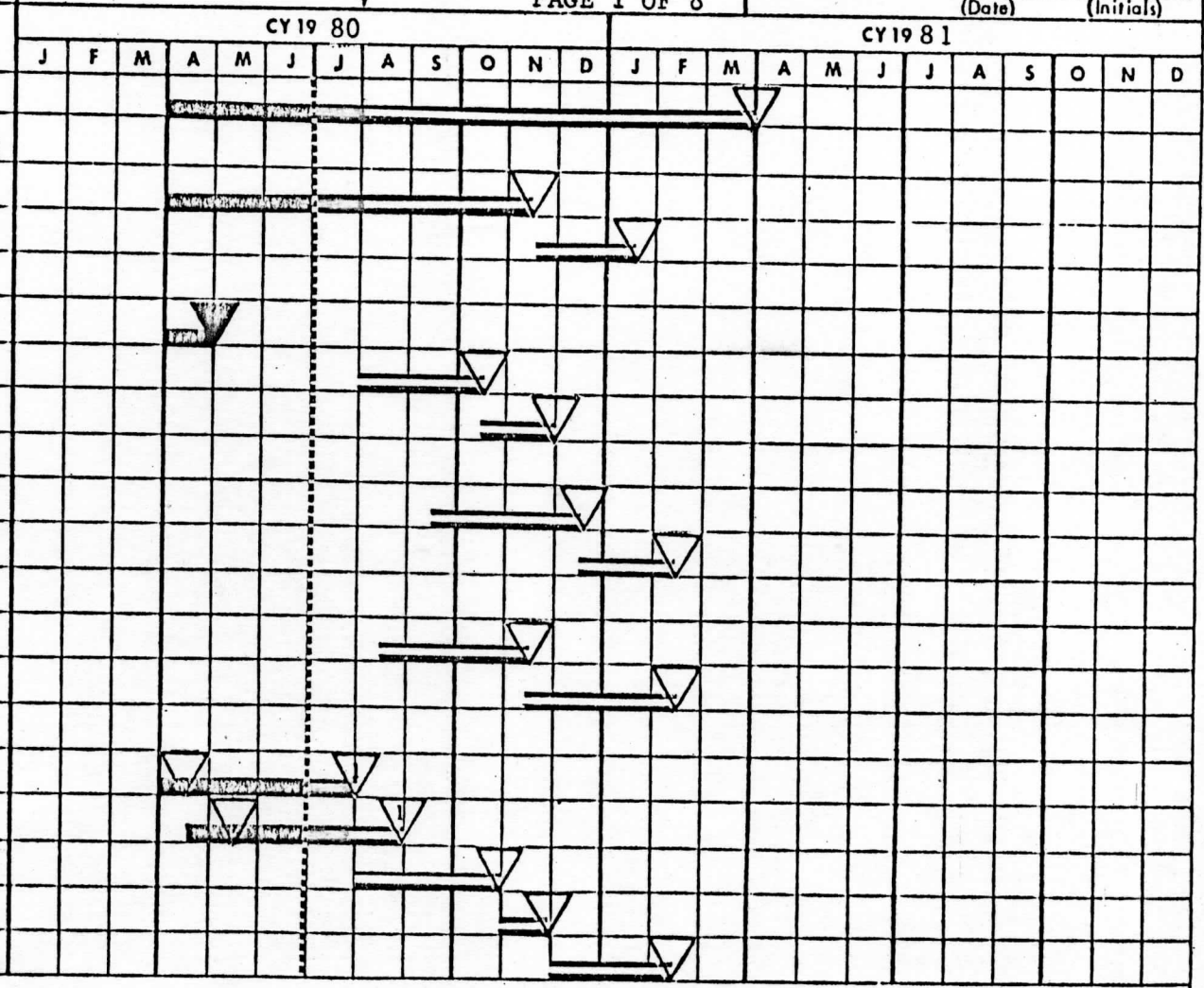
PAGE 1 OF 8

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF 8/1/80 (Date) (Initials)

	MILESTONES
1	ELECTRONICS
2	POWER CONVERTER&DISTR. S/S
3	FLT UNIT #1 FAB
4	FLT UNIT #2 FAB
5	SIGNAL DISTRIB. UNIT
6	EM FAB&TEST
7	FLT FAB
8	FLT TEST
9	PREAMPS (5)
10	FLT FAB
11	FLT TEST
12	DETECTOR ELEC ASSYS (5)
13	FLT FAB
14	FLT TEST
15	HIGH VOLTAGE PWR SUPP
16	EM FAB
17	EM TEST
18	FLT UNIT #1 FAB&TEST
19	FLT UNIT #5 FAB&TEST
20	FLT UNIT # 11 FAB&TEST



X

NOTES
X=SCHEDULE CHANGE

NASA FORM 794 REV. SEP. 63

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—761-316

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF 8/1/80 (Date) (Initials)

.	MILESTONES	CY 1980 J	F	M	A	M	J	J	A	S	O	N	D	CY 1981 J	F	M	A	M	J	J	A	S	O	N	D	
1	ELECTRONICS (CONT)																									
2	DETECTOR CONTROLLERS																									
3	W/W EM																									
4	MLB DESIGN																									
5	FAB EM MLB																									X
6	EM FAB&TEST																									X
7	FAB FLT MLB																									X
8	FLT UNIT FAB																									X
9	FLT UNIT TEST																									X
10	SYSTEM CONTROLLER																									X
11	MLB DESIGN																									
12	FAB EM MLB																									
13	EM FAB&TEST																									
14	FAB FLT MLB																									
15	FLT UNIT FAB&TEST																									
16																										
17	ENGINEERING MODEL																									
18	ASSEMBLY																									
19	INTEG&TEST																									
20	TEST W/SIM. SOFTWARE																									

NOTES
X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—761-318

2 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

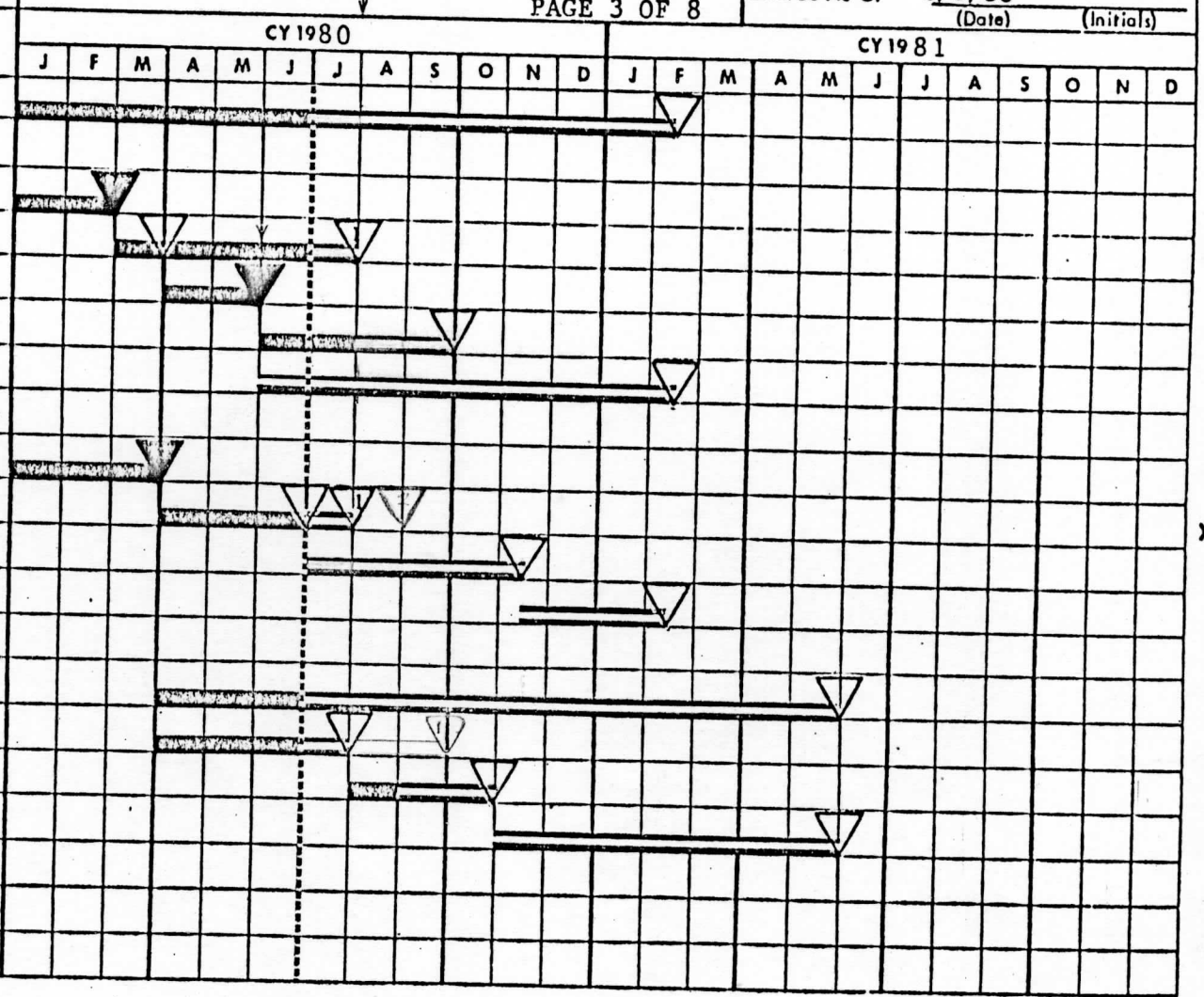
4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF 8/1/80 (Date) _____ (Initials)



NOTES
X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—741-818

2 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

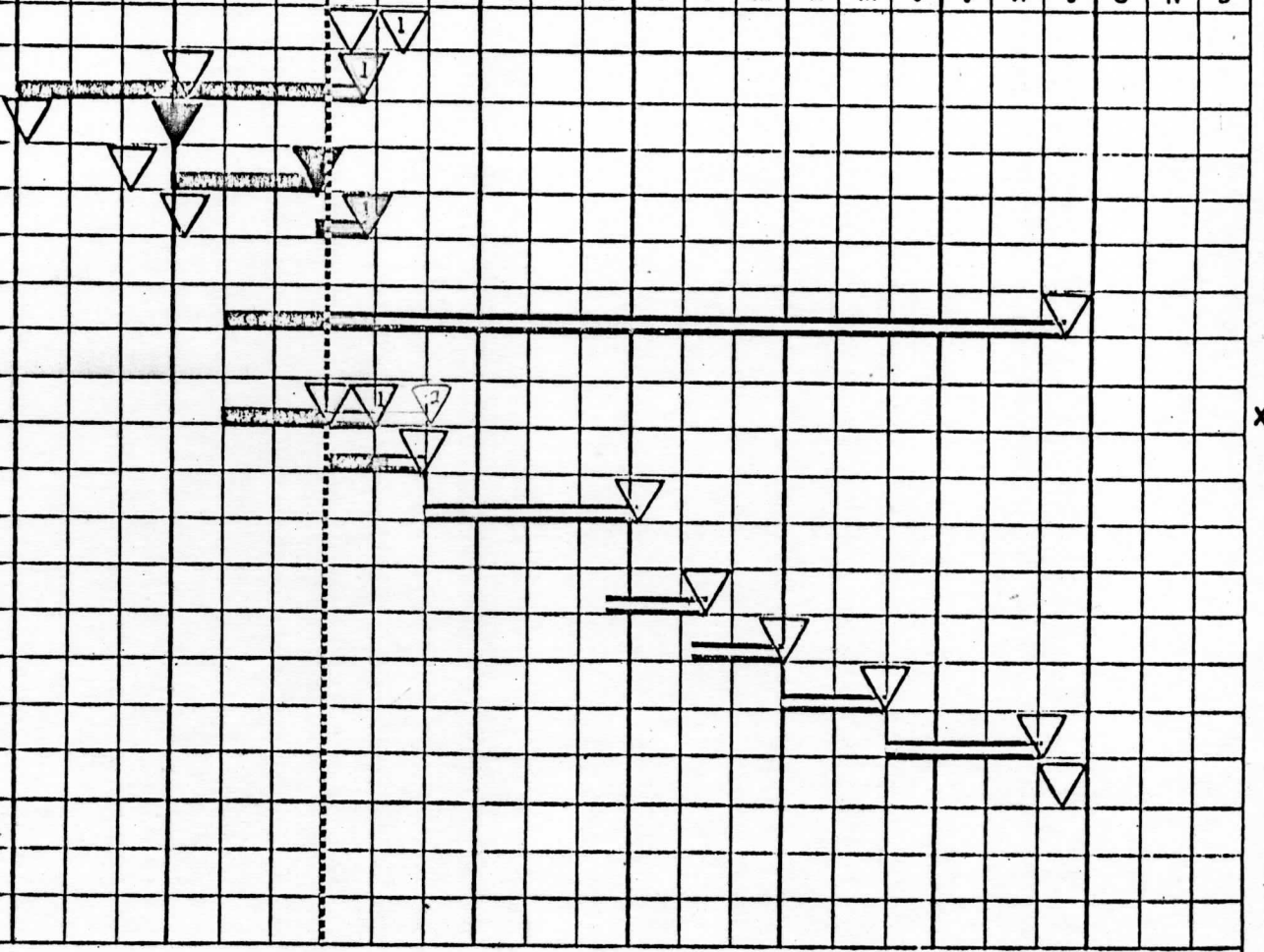
PAGE 4 OF 8

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF 8/1/80 (Date) (Initials)

	MILESTONES
1	CDR
2	THERMAL STRUCT. UNIT
3	FAB&DEL. TO GSFC
4	STRUCTURAL TESTING
5	THERMAL TESTING
6	
7	PROTO FLT UNIT
8	FAB&.ASSY
9	BOX BEAM
10	EBP/BULKHEADS
11	ODS/COND/SKINS
12	INTEGRATION
13	CABLING
14	ELECTRONICS
15	TEST
16	CALIBRATION
17	DEL. TO GSFC
18	
19	
20	



8/27-28

X

NOTES
X=SCHEDULE CHANGE

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* U.S. GOVERNMENT PRINTING OFFICE : 1966 O—241-248

2 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

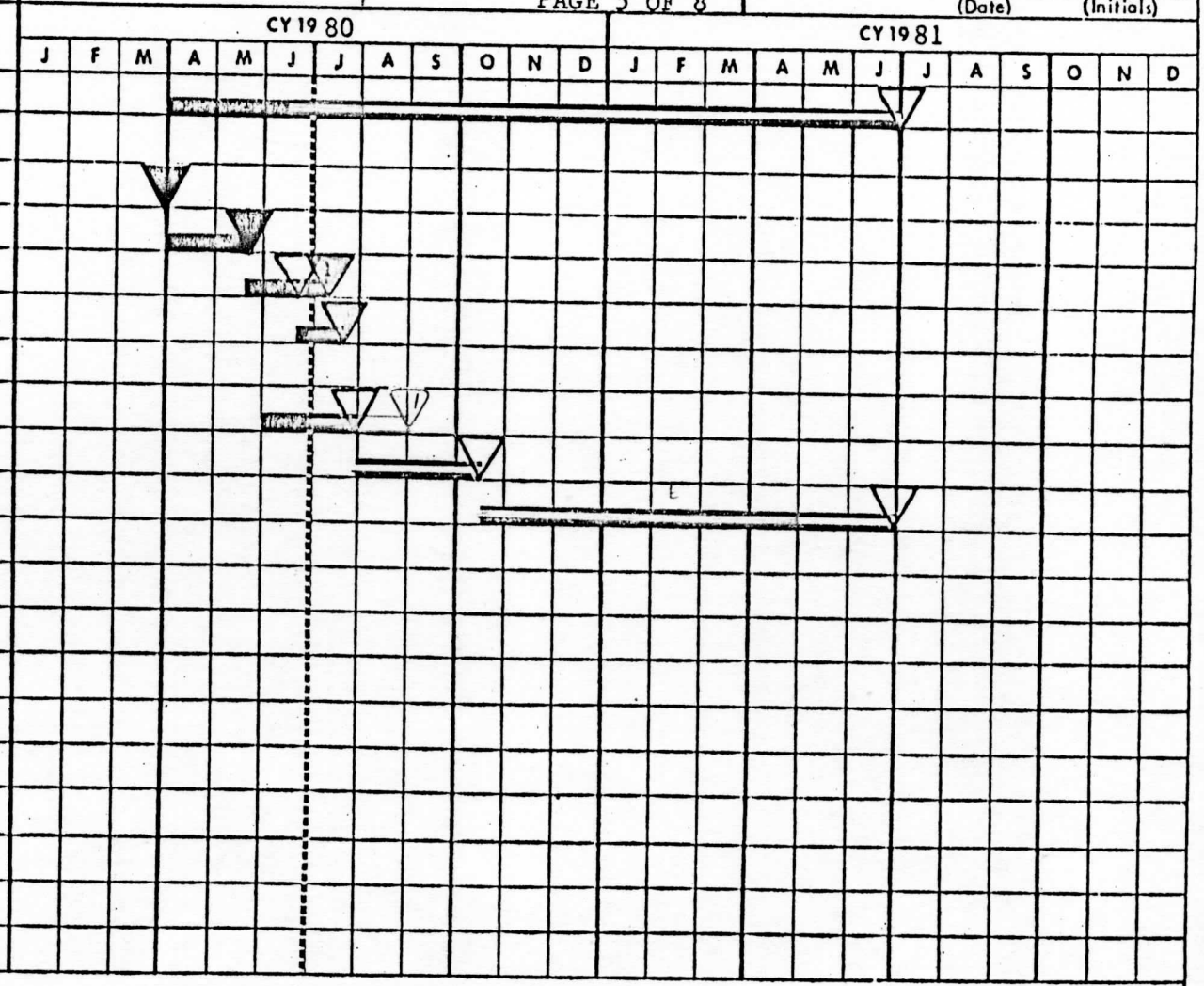
PAGE 5 OF 8

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF 7/1/80 (Date) (Initials)

	MILESTONES
1	GND SUPT EQUIP
2	ELECTRICAL GSE
3	FAB UNIT #1
4	TEST UNIT #1
5	FAB UNIT #2
6	TEST UNIT #2
7	MECHANICAL GSE
8	SIM. I/F DESIGN
9	FAB PFU DOLLY
10	FAB PFU SHIPPING CONT.
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NOTES

X

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* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—741-310

4 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

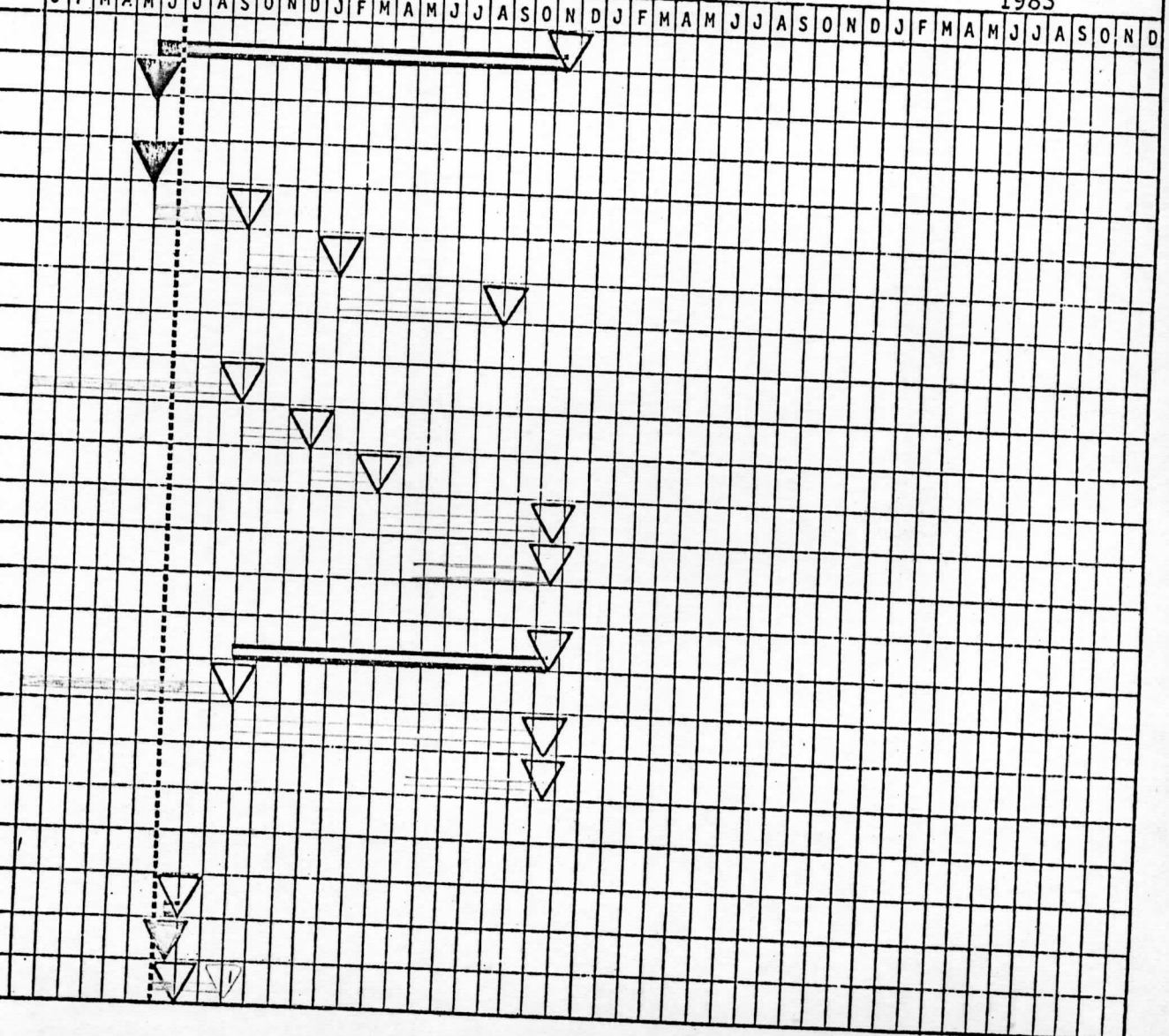
PROJECT HIGH SPEED PHOTOMETER (4 LEVEL)

ORIG. SCHED. APPR. _____ (DATE)

LAST SCHED. CHG. _____ (DATE) (NO.) (INITIALS)

STATUS AS OF 8/1/80 (DATE) (INITIALS)

	MILESTONES
1	FLT SOFTWARE
2	SRD
3	SDD (PDL)
4	PREL
5	UPDATE #1
6	UPDATE #2
7	FINAL
8	CODE
9	PREL
10	UPDATE #1
11	UPDATE #2
12	FINAL
13	USERS MANUAL
14	
15	FLT FIRMWARE
16	PROM
17	PDL
18	USER'S MANUAL
19	
20	
21	GSE SOFTWARE
22	CODE
23	USER'S MANUAL



4 YEAR

CENTER GODDARD SPACE FLIGHT

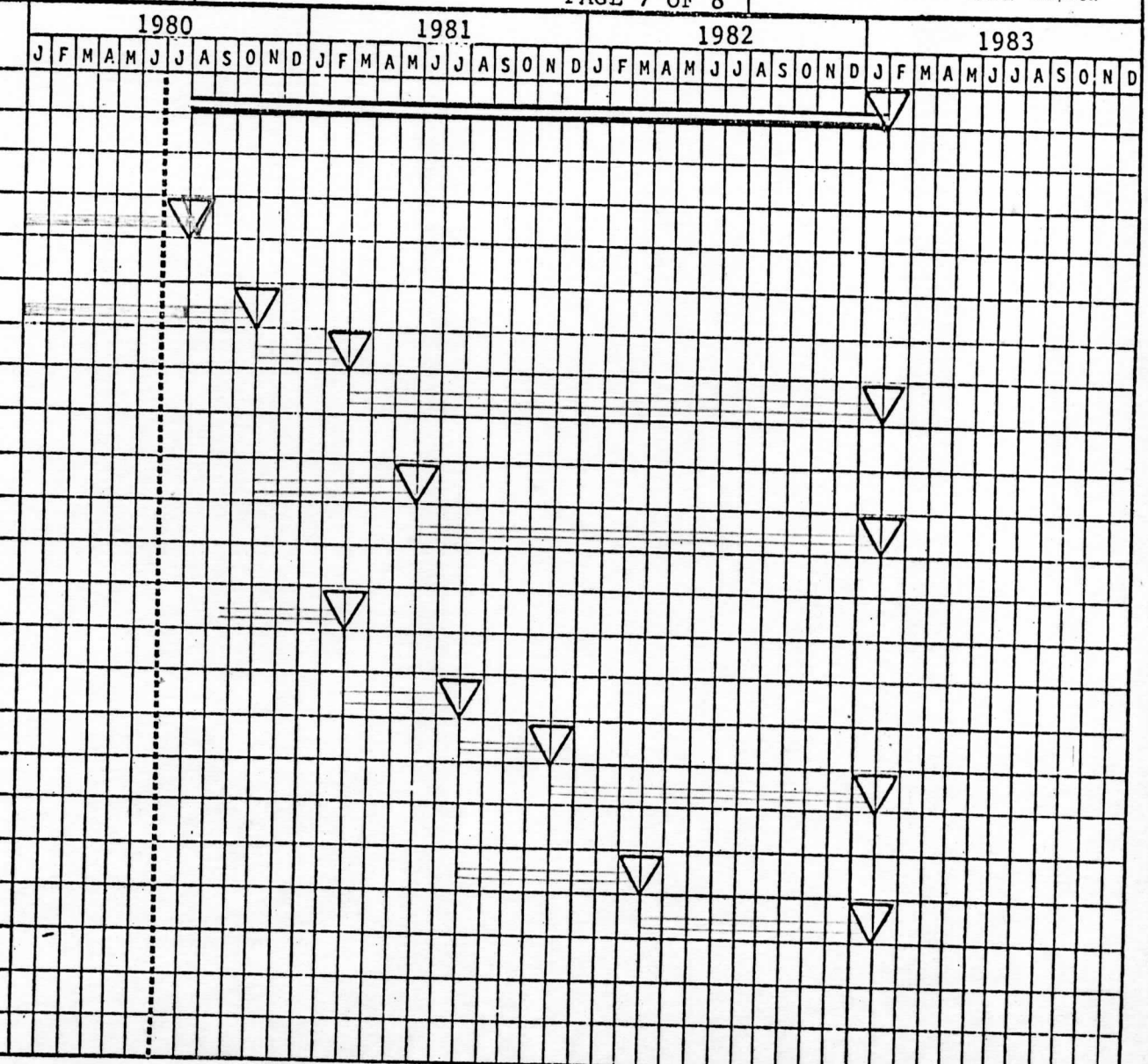
RESPONSIBILITY:
APPROVAL G BURDETT
ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

PROJECT HIGH SPEED PHOTOMETER (4 LEVEL)

ORIG. SCHED. APPR. _____ (DATE)
LAST SCHED. CHG. _____ (DATE) (NO.) (INITIALS)
STATUS AS OF 8/1/80 (DATE) (INITIALS)

	MILESTONES
1	GND DATA MGMT
2	&ANAL S/W
3	REAL TIME
4	SRD
5	SDD (PDL)
6	PREL.
7	UPDATE
8	FINAL
9	CODE
10	PREL.
11	FINAL
12	QUICK LOOK
13	SRD
14	SDD (PDL)
15	PREL.
16	UPDATE
17	FINAL
18	CODE
19	PREL.
20	UPDATE
21	
22	
23	



CENTER GODDARD SPACE FLIGHT

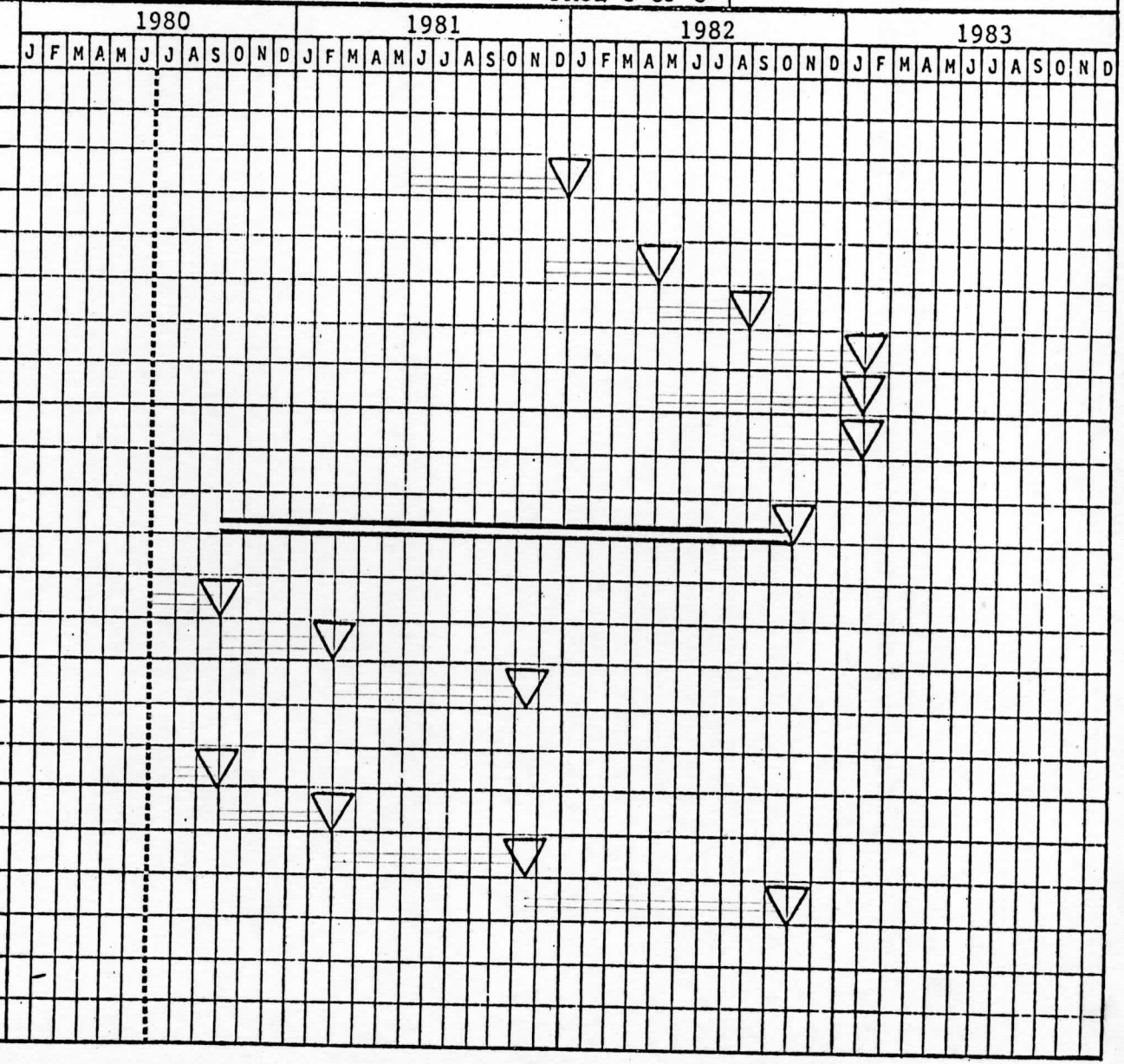
RESPONSIBILITY:
APPROVAL G BURDETT
ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

PROJECT HIGH SPEED PHOTOMETER (4 LEVEL)

ORIG. SCHED. APPR. _____ (DATE)
LAST SCHED. CHG. _____ (DATE) (NO.) (INITIALS)
STATUS AS OF 7/1/80 _____ (DATE) (INITIALS)

	MILESTONES
1	GRND DATA M&A S/W (CONT)
2	ANAL./CALIB.
3	SRD
4	SDD (PDL)
5	PREL.
6	UPDATE
7	FINAL
8	CODE
9	USERS MANUAL
10	
11	SIMULATOR S/W
12	SDD (PDL)
13	PREL
14	UPDATE
15	FINAL
16	CODE
17	PREL.
18	UPDATE
19	FINAL
20	UPDATED FINAL
21	
22	
23	



HSP DELIVERABLE DOCUMENTS

PHASE 1 (NOT UPDATED IN PHASE 2)

AV-01	DELIVERED 11-29-78.
AV-03	DELIVERED 5-8-78.
CM-02	DELIVERED 11-30-78.
CM-03	DELIVERED 12-1-78.
DM-02	NOT DELIVERED.
LS-01	DELIVERED 11-28-78.
MA-01	DELIVERED 11-28-78.
OP-01	DELIVERED 11-78.
PA-01	DELIVERED 11-30-78.

T = TEST L = LAUNCH R = REVIEW
D = DELIVERY OF HARDWARE

HSP DELIVERABLE DOCUMENTS
(PHASE 2)

DR	TITLE	DUE	STATUS
AV-02	VERIFICATION PROCEDURES AND REPORTS	PROCEDURES: T - 4 WKS REPORTS: T + 30 DAYS	TSU PROCEDURES DELIVERED TSU REPORTS: 9-1
AV-04	PRE LAUNCH CALIBRATION REPORT	PRELIM AT PFU DEL UPDATE L - 600	NOTE 1 NOTE 1
AV-05	SI SYSTEM ORBITAL SCIENTIFIC PERFORMANCE ASSESSMENT AND CALIBRATION REPORT	L + 90 DAYS	NOTE 1
CM-04	CUSTOMER REVIEW DATA PACKAGE	R - 2 WEEKS	DUE 8-13-30 (CDR)
CM-05	ACCEPTANCE DATA PACKAGE	LIST: D - 90 DAYS CONTENTS: D	NOTE 1 NOTE 1
CM-06	INTERFACE DATA INPUTS	AS REQUIRED	ALL REQUIRED DATA SUPPLIED
DM-01	SI COMMAND AND DATA LISTS - UPDATE	CDR - 2 WEEKS	C & DH ICD APPENDIX IV, CHANGE 1 7/10/80 - DELIVERED
DM-03	GROUND DATA MANAGEMENT AND ANALYSIS SOFTWARE	SDD: 1/1/83 MANUAL: 1/1/83	PHASED PER SOFTWARE SKD - NOTE 1 NOTE 1
DM-04	GROUND TEST SOFTWARE	MANUAL: 11/15/81	SDD (PDL) / CODE PRELIMINARY 10/1/80
DM-05	FLIGHT SOFTWARE	SDD/MANUAL: 11/15/81	PRELIMINARY SDD (PDL) AND DM-05 SRD REV B DELIVERD 6-30
MA-02	MONTHLY PROGRESS REPORT	MONTHLY	SUBMITTED MONTHLY
MA-03	FINAL REPORT	L + 90 DAYS	NOTE 1
MA-04	FINANCIAL REPORT	MONTHLY, QUARTERLY	SUBMITTED AS REQUIRED
OP-03	OPERATIONS AND DATA MANAGEMENT PROCEDURES	PRELIM: CDR - 2 WKS	TBD - GROUND SYSTEM NOT DEFINED

HSP DELIVERABLE DOCUMENTS, CONTINUED.

DR	TITLE	DUE	STATUS
OP-04	SI SCIENCE AND MISSION OPS SCHEDULE AND PLANNING INPUTS (TARGET LISTS, INTENSITY TRANSFER PARAMETERS)	REPRESENTATIVE LIST: 6/1/81 PRELIMINARY: 6/1/82 FINAL FLIGHT: 3/1/83	NOTE 1 NOTE 1 NOTE 1
PA-02	SAFETY COMPLIANCE DATA PACKAGE	B,C,D,H: CDR - 2 WKS F,G,I,J,K ORI - 2 WKS	8/13/80 NOTE 1
SC-01	SCIENTIFIC INVESTIGATIONS STUDIES REPORT	CDR-2 WKS	INFORMATION CONTAINED IN CM-04
SE-01	SI SYSTEMS DESCRIPTION	PRELIMINARY: PDR + 2 MONTHS UPDATE: CDR + 2 MONTHS USER'S HANDBOOK OUTLINE D - 3 MONTHS FINAL HANDBOOK AND DESCRIPTION, D - 1 MONTH	NOT SUBMITTED EST DEL 10/15/80 NOTE 1 NOTE 1
SE-02	MASS PROPERTIES REPORT	BIMONTHLY	SUBMITTED WITH MA-02
SE-03	MATH MODELS AND ANALYSES - STRUCTURAL THERMAL	4/30/79 4/30/79	DELIVERED & UPDATED DELIVERED & UPDATED
SE-04	DRAWING DOCUMENTATION	AS REQUIRED	CDR PKG 10/13/80
SE-05	DESIGN REFERENCE MISSION INPUT - UPDATE	CDR - 2 WEEKS L - 3 MONTHS	11/78 VERSION CURRENT - DELIVERED NOTE 1

NOTE 1 - ITEM NOT YET DUE, PLANNED DELIVERY IS AS REQUIRED.

Don Johnson

DR-MA-02 Number 29
including SE-02
Issued: Sept. 11, 1980

Monthly Report

for

August 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The HSP Critical Design Review (CDR) was held at GSFC on August 27,28. Although the review committee report has not been written, there were no action items assigned nor serious concerns expressed at the review. The flight unit fabrication and assembly will, therefore, proceed based on the design presented at the review.

After the CDR the TSU was prepared for shipment back to Wisconsin where it will serve as a wiring harness assembly fixture for the next several months.

The possible design changes intended to raise certain interface temperatures mentioned in last month's report have been evaluated and found to be ineffective. The thermal design will, therefore, not be changed.

Engineering model integration was slowed by difficulties in integrating the system controller bus director software. The software is expected to be debugged by the end of the month.

Tests of the engineering model image dissector tube (IDT) were completed in August. The first flight UV IDT was also tested in August. The results were satisfactory and were presented at the CDR. Testing will continue on the flight IDT's which have been received from ITT. The final two IDT's have been delayed because of a corona problem, but are expected by October 1.

The second PMT (an operable reject) was assembled and potted in August. It is awaiting the completion of arrangements for a vibration test. The engineering model PMT assembly cannot be completed until a corotron voltage regulator is received.

A final PCDS review prior to flight unit fabrication is scheduled for September 17 at Collins Radio. There are several materials selection issues to be resolved prior to flight unit assembly.

The engineering model HVPS was completed and tested in August. Performance met requirements, but potting material dissipation factors had a greater than anticipated effect. An alternative potting material has been suggested by GSFC and will be adopted if tests show improved performance. The present potting is acceptable if the alternative is not an improvement.

The detector controller multilayer board (MLB) review will be held in early September. Delivery of engineering model system controller MLB's is expected by mid September. Most of the flight single and double sided boards have been received.

The flight unit structure assembly continued in August. The box beam was completed and the forward bulkhead was received. Mechanical support, shipping, and handling equipment (MGSE) is well along, some items having been completed.

The HSP power and weight budgets remain unchanged from last month's report.

B. Schedule

The schedule is as reported last month with the following exceptions:

1. engineering model integration has been delayed 4-6 weeks
2. PFU EBP/bulkhead assembly is expected to be complete by 11-1.

Delivery of the PFU is expected to be as shown on last month's schedule.

C. Problem Areas

No major problems.

D. Science Section

The flight model relay mirrors were received in August.

E. Documentation

The following documents were delivered in August:

1. DM-03 Ground Data Management and Analysis SRD
2. PA-02 Safety Information/Hazards List (items B,C,D,H)
3. CM-04 CDR Data Package.

F. CCB Activity

SI-OTA/SSM ICD PIRN's	Action
2107	Approved July 29
2110	Disapproved in letter from Richards to Tenerelli, Aug. 3
2111	Approved Aug. 18 with proposed additional wording
2112	Approved Aug. 15

55/51 D. Johnson

DR-MA-02 Number 30
including SE-02
Issued: Oct. 2, 1980

Monthly Report

for

September 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Fabrication and assembly of the flight unit structure and electronics continued in September. As no report or action items have been received as a result of the CDR, work is progressing toward completion of the flight unit based on the design presented at CDR.

By the end of the month the PFU structure assembly had reached the point of assembling the box beam with the forward and aft bulkheads. The forward and aft bulkheads have been aligned to the fixtures and the A and B interface fitting supports attached to the bulkheads.

The flight single and double-sided printed wiring boards have been received, drilled, and trimmed. The assembly drawings, parts lists, and traceability records have been prepared for kitting flight analog electronics which will begin in October. Formal training classes in NASA soldering requirements were conducted in September. The engineering model system controller multilayer board was received and assembly has begun. The detector controller multilayer board design was completed and reviewed during the month. Completion of required changes and start of EM board fabrication are expected in early October.

The bus director software was completed in late September except for the portion involving high speed serial data. A PROM was programmed and tested, and was being debugged at the end of the month. Completion of the engineering model integration is now expected in October.

A PCDS program review was held at Rockwell-Collins in Cedar Rapids in mid September. The design changes resulting from engineering model test problems were reviewed and approved. The first flight unit PCDS will be delivered in late January if parts are received by mid October. All open material issues have been either settled or nearly settled.

The HVPS flight units will be built in-house as a result of an agreement with the subcontractor. The potting material may be changed from Scotchcast to Conap if thermal tests of Conap prove as promising as some electrical tests done in September. The new potting, if adopted, could reduce electrical losses substantially.

The HSP power and weight budgets remain unchanged from last month's report.

B. Schedule

The major schedule changes from last month are as follows:

1. PCDS deliveries are now Feb. 1, 1981 and March 1, 1981
2. Detector controller EM MLB fabrication will be delayed
3. Software schedules have been revised in consultation with IBM

A revised schedule is attached.

C. Problem Areas

Although not a pressing problem until now, part deliveries may now become the major influence on cost and schedule. Our flight electronics fabrication schedule assumes delivery of most parts from screening on October 1. Previously it has been difficult to obtain detailed and reliable schedule information about the parts in screening. A parts review was held in early September during which the problem was discussed. It was agreed that schedule visibility would be improved for the parts remaining in screening after October 1. This improvement has not occurred to date, but is expected shortly. If problems persist in this area, it will have a major program impact. The remaining program schedule depends on detailed knowledge of remaining parts deliveries.

D. Science Section

A team meeting in October is now being scheduled. The meeting will be devoted entirely to HSP observing programs.

E. Documentation

A revised DM-03 Ground Data Management and Analysis SRD was delivered in September.

F. CCB Activity

ICD-02 PIRN's	Action
2110	Item 1 -- approved 9/15 Item 2 -- no impact on PFU, $2000 impact if necessary to mod. TSU to conform to PIRN Item 3 -- approved with proviso's related to $\alpha \geq 0.8$
2111R3	Received 9/29
2114	Approved 9/19
2115	Approved 9/15
2119R1	Approved 9/25

Don Johnson 55/31

DR-MA-02 Number 31
no longer includes SE-02
Issued: November 7,1980

Monthly Report

for

October 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Work on the flight unit continued in October. Still no report or action items received from the August CDR, so we continue to build the instrument as presented at the CDR.

Some questions related to the CDR have been received. One concern related to the status of optical filters. The design and location of the filters permits selection and installation at a late date. Because of the rephasing, the flight filters will likely not be installed for PFU acceptance tests at GSFC in late 1981. The flight filters will be installed shortly before final calibration prior to delivery to VAP in April 1983. This will shorten the time that the flight filters will be exposed to the elements prior to launch. For PFU acceptance tests, a preliminary set of filters will be installed. The mechanical design of the filter assembly will, therefore, be included in the test. Some (or perhaps all) filters can be manufactured in-house. Others may be procured from readily available sources. The optical filters are not, therefore, regarded as an item of great concern at this time. The mechanical support structure for the filter assembly has been designed and built.

Another concern related to the accuracy of the reliability prediction and the adequacy of the hazard information presented at CDR. These matters are being discussed with GSFC.

The PFU structure has now progressed to the point of installing the internal bulkheads. During the month the box beam and baseplate were installed. Two-man assembly operation is planned to begin in November.

Kitting and assembly of the flight electronics has begun. Most subassemblies cannot be completed due to parts shortages. Assembly will proceed as far as possible and continue when the late parts arrive. Presently there is sufficient backlog of partial assembly work to be done so that part shortages are not causing schedule impact. However, if part deliveries continue to slip, significant schedule impact can be expected. The area of greatest concern now is delivery of several ITT Cannon connectors, ordered in January 1980, promised in July, repeatedly incrementally slipped, and just now reported to be 20-28 weeks away. (The original delivery quote in January was 28 weeks). This is now being intensively expedited.

The engineering model multilayer board system controller assembly was completed in October. The board will be installed in the box and terminal-to-connector wiring completed in November. Engineering model multilayer boards for the detector controller were released to production during the month.

A preliminary version of the 8080 firmware has been debugged and is now being used for engineering model tests. Work continues to complete GSE software necessary for capturing and displaying engineering data in a frame format. (Presently engineering data must be requested item by item).

A preliminary PDL for target acquisition/verification software was reviewed prior to its scheduled submittal in early November.

There have been several screening failures in the GSFC/Sperry flight parts testing program. In all cases to date replacement parts have been obtained, but the time required to reprocess and rescreen will have some schedule impact. The PCDS production schedule was based on all parts being received from screening in early October, but at least two line items are delayed substantially beyond October, one due to a recent screening lot failure.

Work has resumed at ITT on the last two IDT assemblies. The fifth flight unit was disassembled, but no definite cause of the corona problem was found. There were several suspicious areas that will be reworked and all capacitors and both high voltage cables replaced. Assembly, test, and delivery are expected to be complete by mid-November. ITT will then work on unit number 6.

B. Schedule

The updated schedule is attached. Schedules for fabrication and testing of flight electronics must be regarded as highly tentative due to the unsettled parts delivery situation. This area is being monitored closely and workarounds are being implemented.

C. Problem Areas

As described above, part delivery, particularly connectors, is the most pressing problem.

Resolution of the surface property question (MAXORB) has not been accomplished and the HSP PFU continues to be assembled to conform to the ICD (except as noted in our ICD review comments). The possible impact of changes to the ICD increases daily as assembly proceeds.

The C&DH Simulator is a source of several current problems:

The Versatec printer is unsuitable as a logging device because when it prints a line at a time at a low rate, the line dissolves before it is advanced out of the printing head and the paper comes out blank, or actually a dirty grey. There is no evidence whatever of any printing on the paper.

The STOL language is much more limited than generally realized. The lack of a mechanism to write messages to the CRT and line printer is particularly limiting.

There are apparent hardware problems that are preventing the Simulator from correctly issuing commands to the HSP. The difficulty seems to be in the SSIU or perhaps the RIU. The RIU works well with the HSP GSE, however.

D. Science Section

The team meeting planned for October was cancelled due to difficulties in finding an acceptable date and late changes in plans caused by other meetings convened at short notice by the project.

E. Documentation

A preliminary DM-04, Ground Data Management and Analysis SDD (PDL), for target acquisition will be delivered in early November.

At the request of GSFC, the monthly report will no longer contain weight and power status. Weight and power will be reported quarterly, the first report due at GSFC on 1/1/81.

Work continues on SE-01.

F. CCB Activity

A revised SI to OTA/SSM ICD was received in October. The revised ICD incorporated PIRN 2110R1, which was never reviewed by HSP. PIRN 2110 was received and partially accepted.

GSFC requested that we only respond to PIRNs/PSCNs that have first been processed by the GSFC ICB.

STR-02 PSCN	Action
2004	10/30 received

SI-OTA/SSM ICD PIRNs	Action	
2107	11/5	noted as approved on 7/29/79
2110R1	11/5	$2K if required to incorporate in TSU, $0 is required for PFU only
2111R3	10/7	approved with proviso regarding bonding resistance value verification
2112	11/5	noted as approved 8/15
2115	11/5	noted as approved 9/15
2116R1	11/5	approved

SI-OTA/SSM ICD PIRNs (cont.)	Action
2117R1	rejected by GSFC
2122	11/5 not approved (first received 10/8, letter of non-approval to R. White 10/10)

SI-SI C&DH ICD PIRNs	Action
059	10/14 received
060	10/8 received
061	10/9 approved

SI-SI C&DH Unique Appendix PIRNs	Action
Power Bus Switching Configuration	10/28 submitted by HSP
Pin Designations	10/28 submitted by HSP
Relay Command Interface Circuit Description	10/28 submitted by HSP
Engineering Data Interface Circuits	10/28 submitted by HSP
1.024 MHz Clock Interface	10/28 submitted by HSP

GSFC Technical Directions	Action
HSP-011	10/23 approved

2 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF ~~10/1/80~~ 11-1-80 (Date) (Initials)

	MILESTONES	CY 1980 J	F	M	A	M	J	J	A	S	O	N	D	CY 1981 J	F	M	A	M	J	J	A	S	O	N	D	
1	ELECTRONICS																E									
2	POWER CONV&DISTR S/S																									
3	FLT UNIT #1 FAB																									X
4	FLT UNIT #2 FAB																									X
5	SIGNAL DISTRIB UNIT																									
6	EM FAB&TEST																									
7	FLT FAB																									
8	FLT TEST																									
9	PREAMPS (5)																									
10	FLT FAB																									
11	FLT TEST																									
12	DETECTOR ELEC ASSYS (5)																									
13	FLT FAB														E											PARTS
14	FLT TEST															E										PARTS
15	HIGH VOLT PWR SUPP																									
16	EM FAB																									
17	EM TEST																									
18	FLT UNIT#1 FAB&TEST													E												PARTS
19	FLT UNIT #5 FAB&TEST																									
20	FLT UNIT #11 FAB&TEST																									

NOTES X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

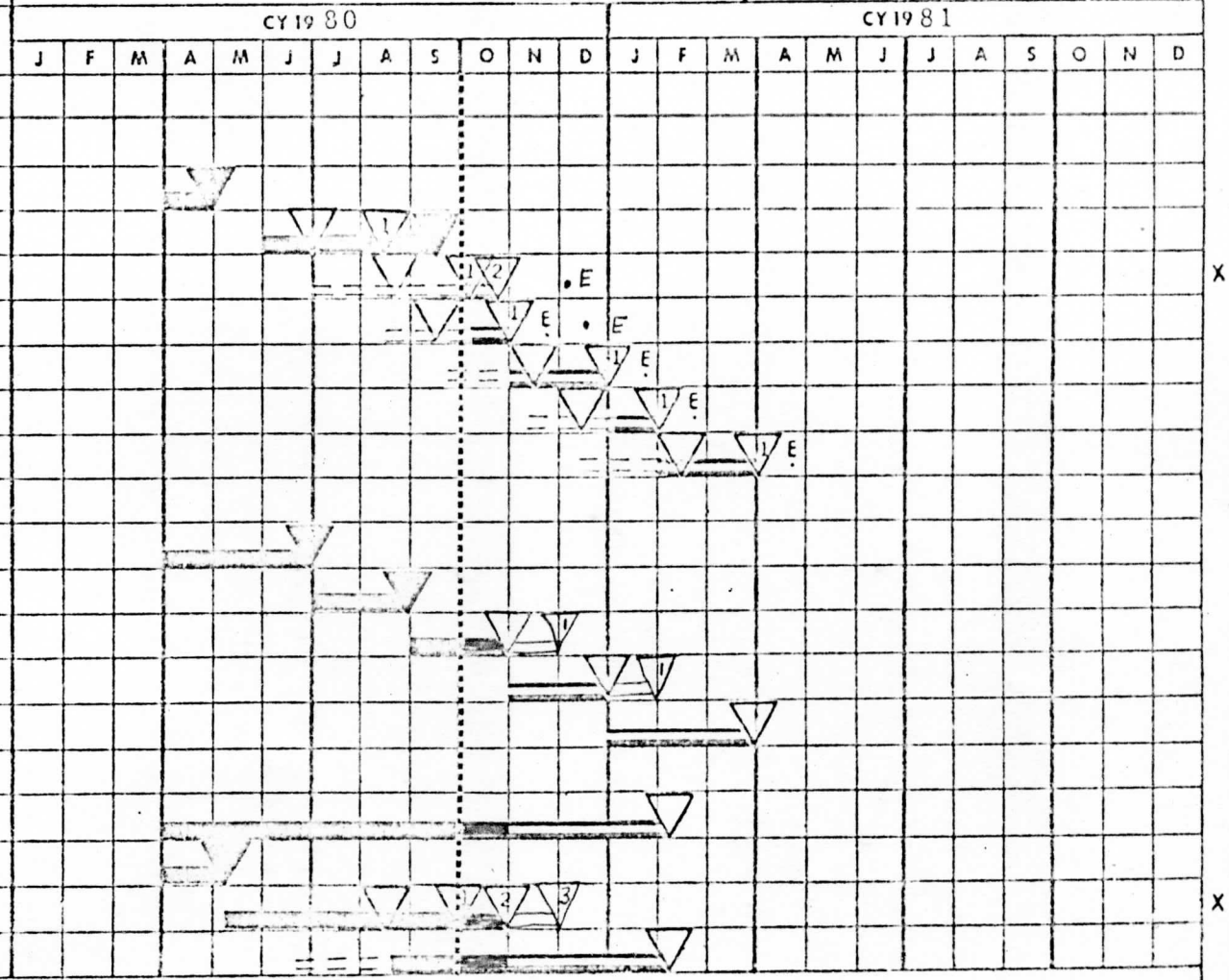
4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF ~~10/1/80~~ 11-1-80 (Date) (Initials)



	MILESTONES
1	ELECTRONICS (CONT)
2	DETECTOR CONTROLLERS
3	W/W EM
4	MLB DESIGN
5	FAB EM MLB
6	EM FAB&TEST
7	FAB FLT MLB
8	FLT UNIT FAB
9	FLT UNIT TEST
10	SYSTEM CONTROLLER
11	MLB DESIGN
12	FAB EM MLB
13	EM FAB&TEST
14	FAB FLT MLB
15	FLT UNIT FAB&TEST
16	
17	ENGINEERING MODEL
18	ASSEMBLY
19	INTEG&TEST
20	TEST W/SIM SOFTWARE

X

X

NOTES X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE 1966 O—741-518

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

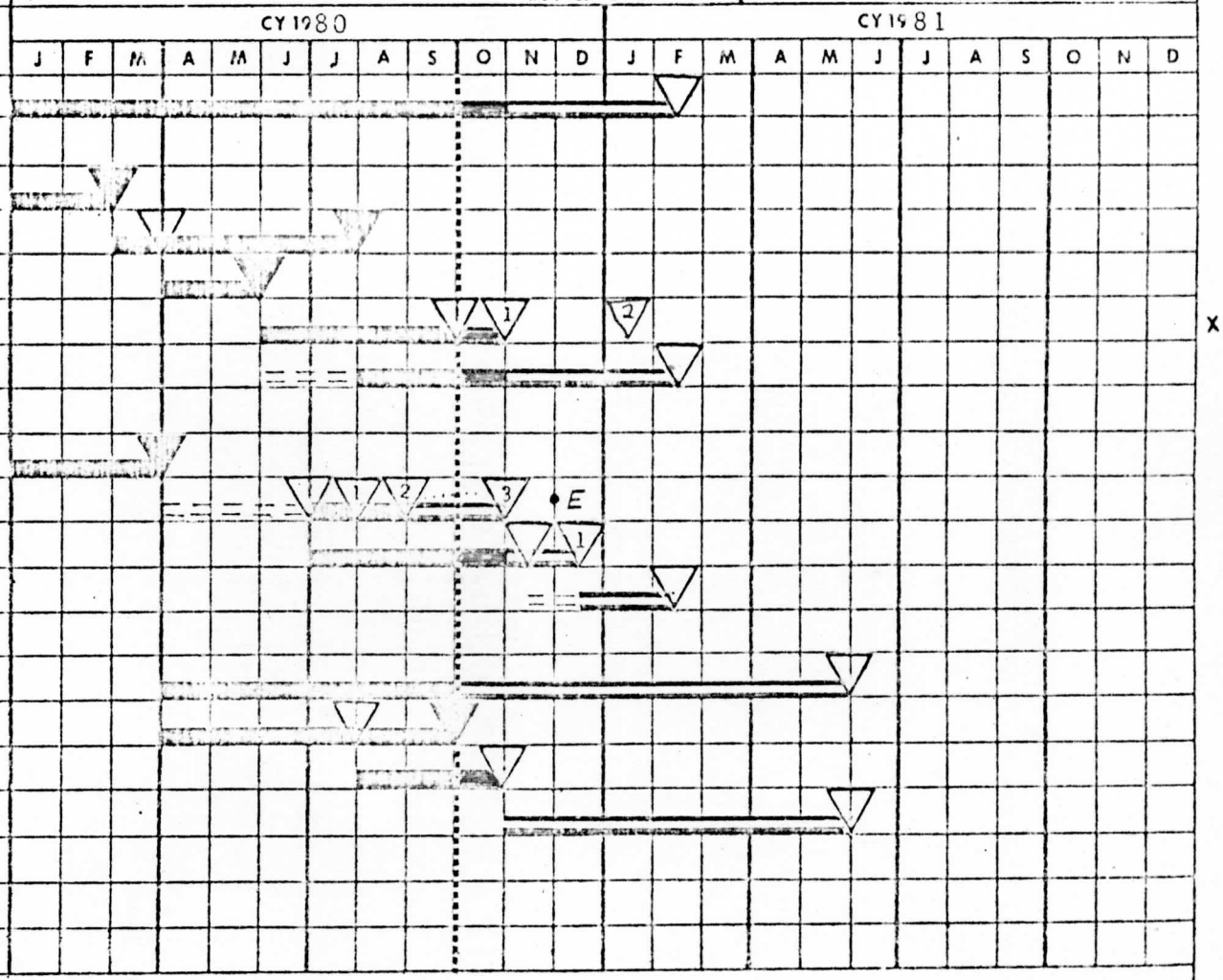
4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF ~~10/1/80~~ (Date) 11-1-80 (Initials)



X

NOTES X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

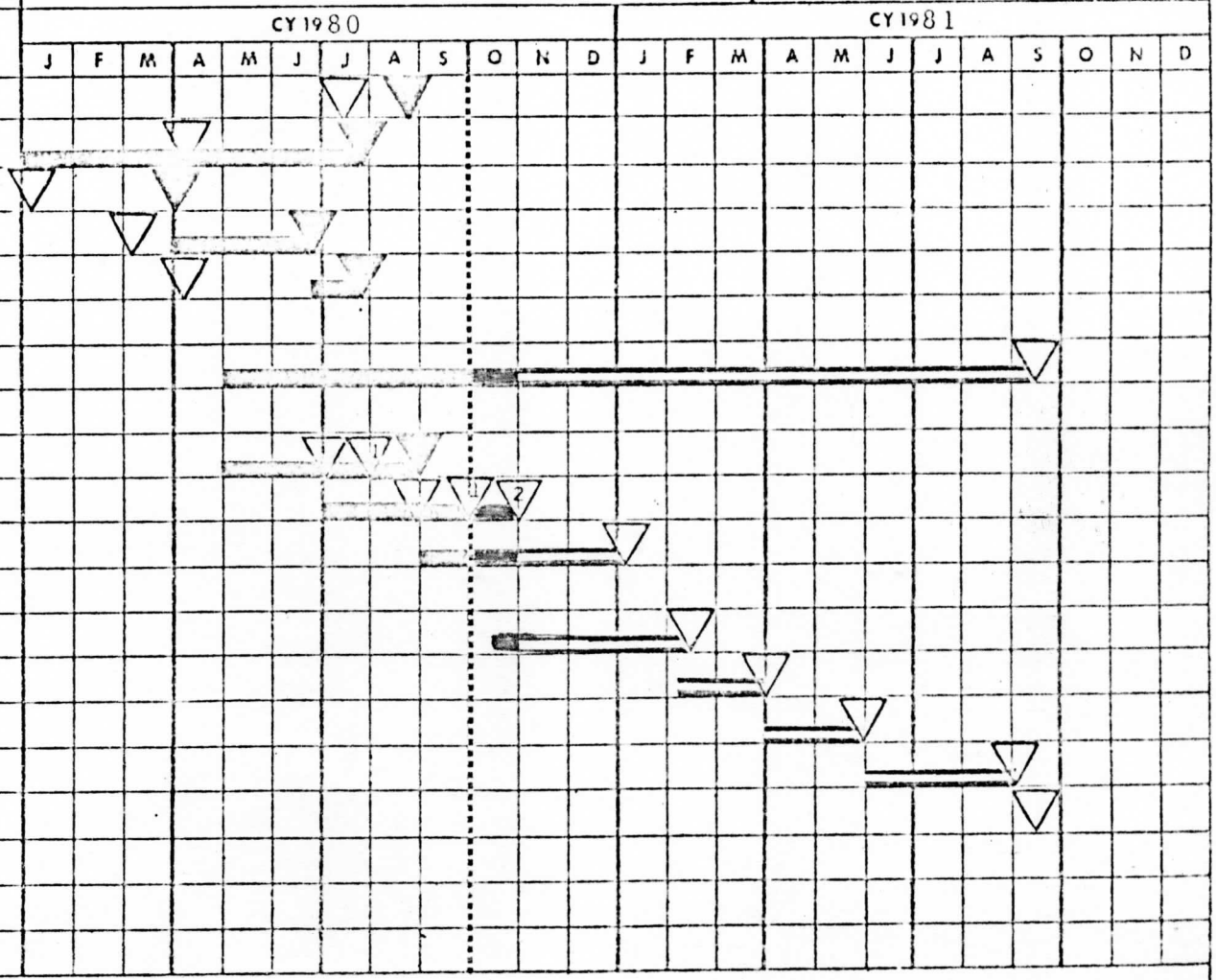
PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF ~~10/1/80~~ 11-1-80 (Date) (Initials)

	MILESTONES
1	CDR
2	THERMAL STRUCT. UNIT
3	FAB&DEL TO GSFC
4	STRUCTURAL TESTING
5	THERMAL TESTING
6	
7	PROTO FLT UNIT
8	FAB&ASSY
9	BOX BEAM
10	EBP/BULKHEADS
11	ODS/COND/SKINS
12	INTERGRATION
13	CABLING
14	ELECTRONICS
15	TEST
16	CALIBRATION
17	DEL TO GSFC
18	
19	
20	



X

NOTES
X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE : 1964 O—741-218

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

4 LEVEL

PROJECT HIGH SPEED PHOTOMETER

ORIGINAL SCHEDULE APPROVAL _____ (Date)

LAST SCHEDULE CHANGE _____ (Date) (No) (Initials)

STATUS AS OF ~~10/1/80~~ 11-1-80 (Date) (Initials)

	MILESTONES	CY 1980 J	F	M	A	M	J	J	A	S	O	N	D	CY 1981 J	F	M	A	M	J	J	A	S	O	N	D
1	GND SUPT EQUIP														E										
2	ELECTRICAL GSE																								
3	FAB UNIT #1																								
4	TEST UNIT #1																								
5	FAB UNIT #2																								
6	TEST UNIT #2																								
7	MECHANICAL GSE																								
8	SIM I/F DESIGN																								
9	FAB PFU DOLLY																								
10	FAB PFU SHIPPING CONT														E										
11																									
12																									
13																									
14																									
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NOTES
X=SCHEDULE CHANGE

* U.S. GOVERNMENT PRINTING OFFICE 1964 O—761-338

4 YEAR

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

PROJECT HIGH SPEED PHOTOMETER

4 LEVEL

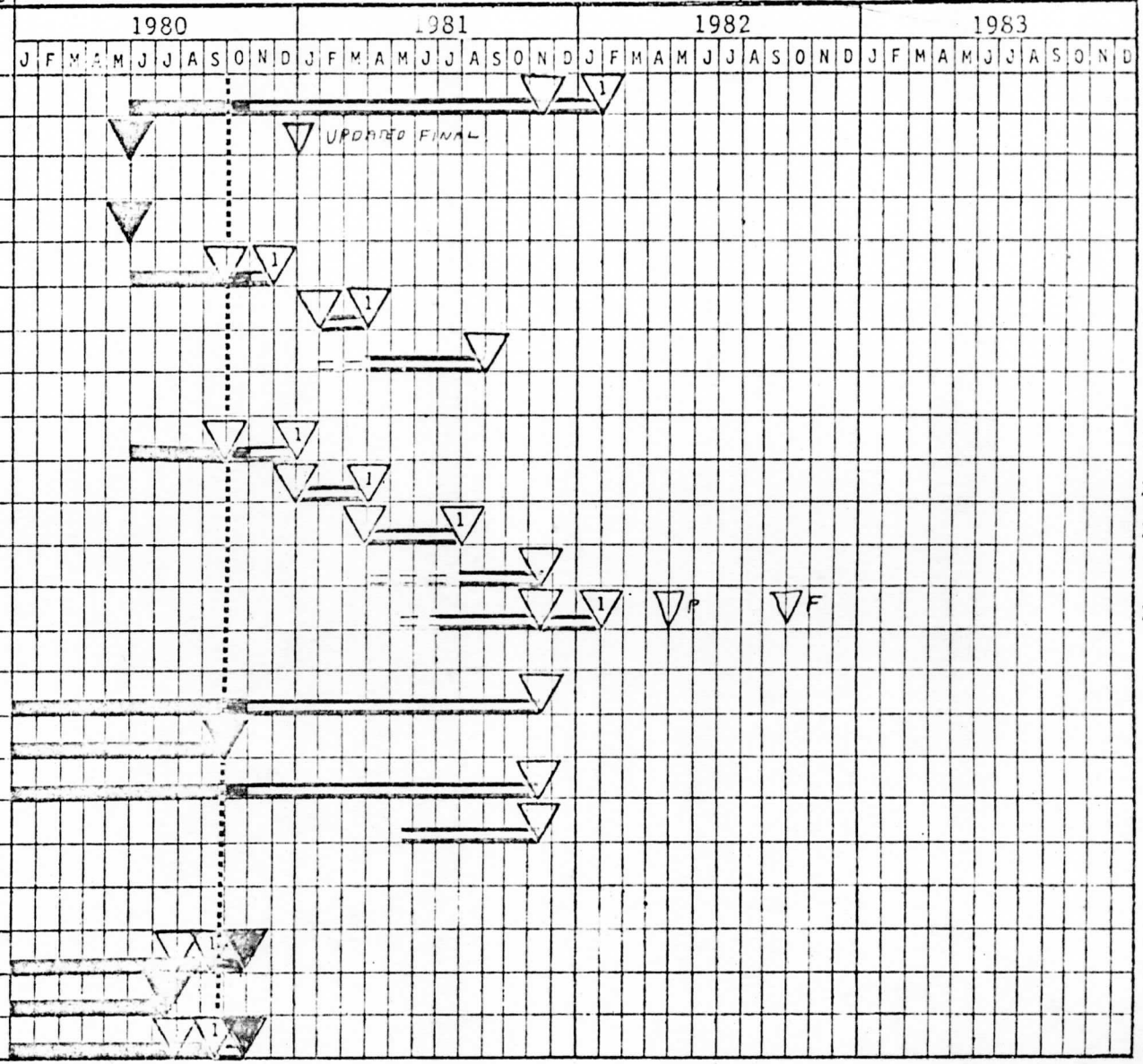
PAGE 6 OF 8

ORIG. SCHED. APPR. _____ (DATE)

LAST SCHED. CHG. _____ (DATE) (NO.) (INITIALS)

STATUS AS OF ~~10/1/80~~ 11-1-80 (DATE) (INITIALS)

	MILESTONES	
1	FLT SOFTWARE	
2	SRD	
3	SDD (PDL)	
4	PREL	
5	UPDATE #1	X
6	UPDATE #2	X
7	FINAL	
8	CODE	
9	PREL (PO)	X
10	UPDATE #1	X
11	UPDATE #2	X
12	FINAL	
13	USERS MANUAL	X IBM Rec
14		
15	FLT FIRMWARE	
16	PROM	
17	PDL	
18	USERS MANUAL	
19		
20		
21	GSE SOFTWARE	
22	CODE	
23	USERS MANUAL	



X=SCHEDULE CHANGE

CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

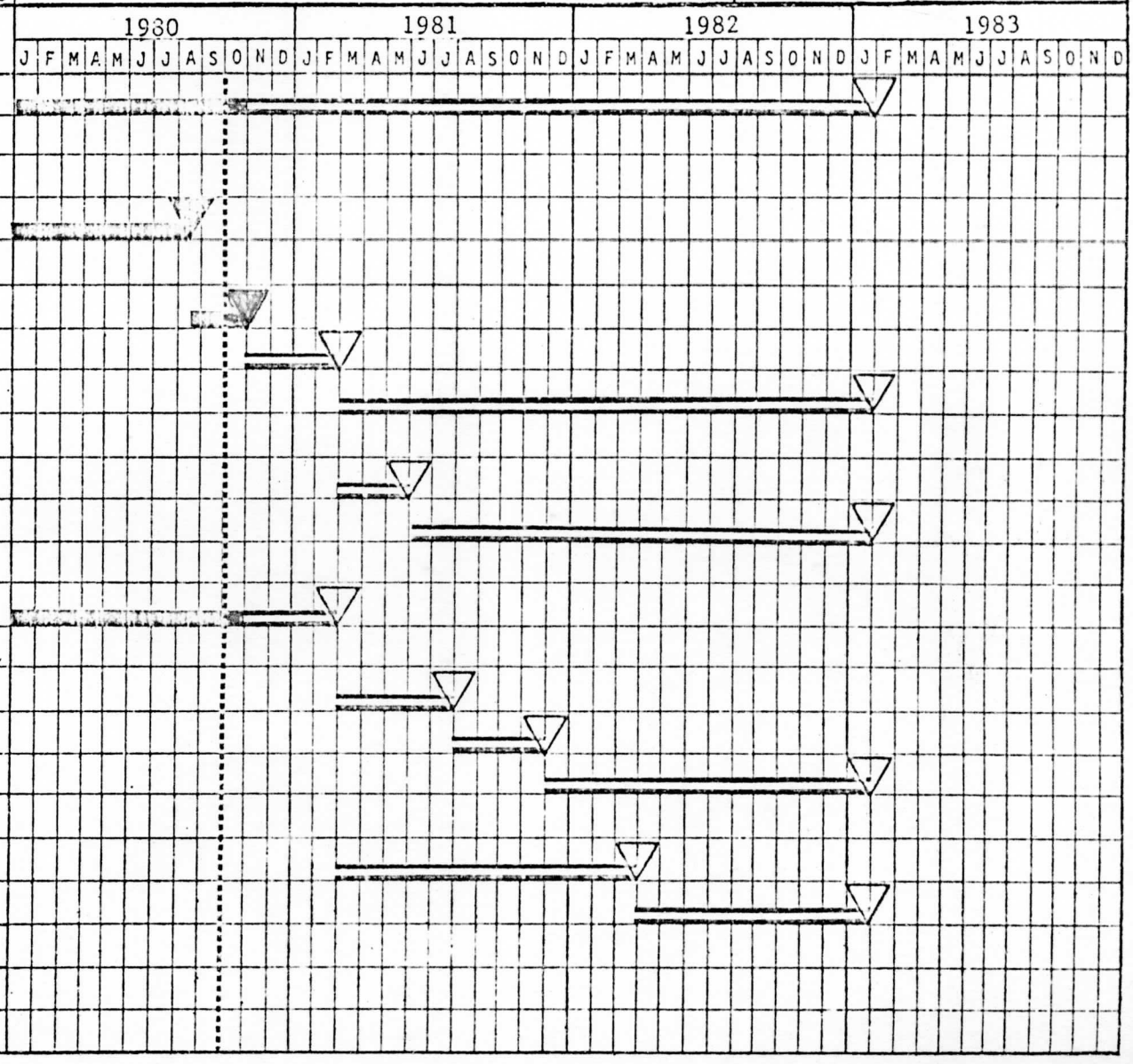
PROJECT HIGH SPEED PHOTOMETER (4 LEVEL)

ORIG. SCHED. APPR. _____ (DATE)

LAST SCHED. CHG. _____ (DATE) (NO.) (INITIALS)

STATUS AS OF 10/1/80 11-1-80 (DATE) (INITIALS)

	MILESTONES
1	GND DATA MGMT
2	&ANAL S/W
3	REAL TIME
4	SRD
5	SDD (PDL)
6	PREL
7	UPDATE
8	FINAL
9	CODE
10	PREL
11	FINAL
12	QUICK LOOK
13	SRD
14	SDD (PDL)
15	PREL
16	UPDATE
17	FINAL
18	CODE
19	PREL
20	UPDATE
21	
22	
23	



CENTER GODDARD SPACE FLIGHT

RESPONSIBILITY:
APPROVAL G BURDETT

ACCOMPLISHMENT R WHITE

MILESTONE SCHEDULE

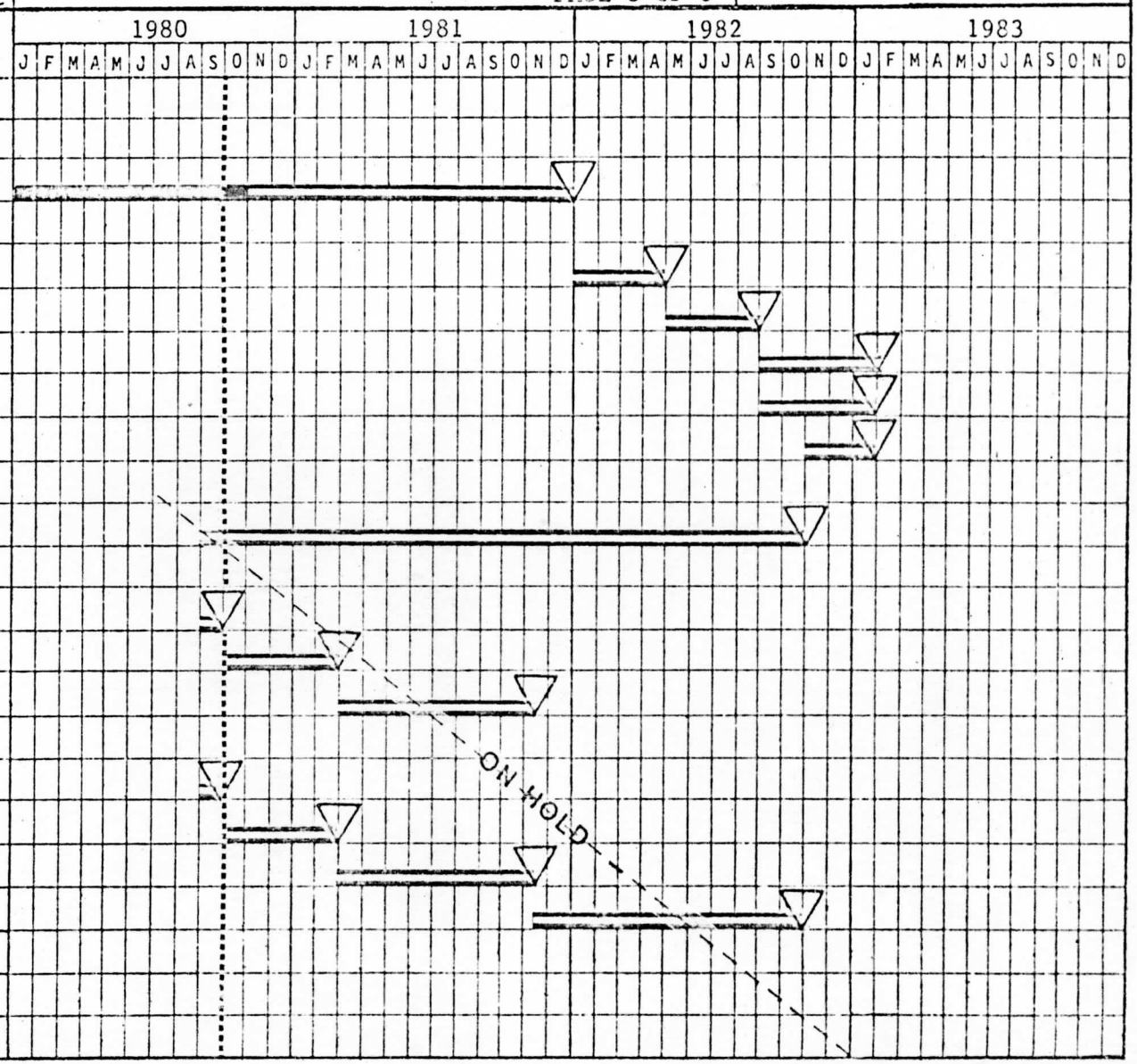
PROJECT HIGH SPEED PHOTOMETER (4 LEVEL)

ORIG. SCHED. APPR. _____ (DATE)

LAST SCHED. CHG. _____ (DATE) (NOTE) (INITIALS)

STATUS AS OF 10/1/80 11-1-80 (DATE) (INITIALS)

	MILESTONES
1	GND DATA M&A S/W (CONT)
2	ANAL/CALIB
3	SRD
4	SDD (PDL)
5	PREL
6	UPDATE
7	FINAL
8	CODE
9	USERS MANUAL
10	
* 11	SIMULATOR S/W
12	SDD (PDL)
13	PREL
14	UPDATE
15	FINAL
16	CODE
17	PREL
18	UPDATE
19	FINAL
20	UPDATED FINAL
21	
22	
23	



* NOTE: Lines 11 thru 20 on hold for IBM Input

Don Johnson
SEC/ VBT

DR-MA-02 Number 32
Issued: December 4, 1980

Monthly Report

for

November 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
U.W.Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The flight unit structure assembly continued in November. By the end of the month the internal bulkheads and the GSE hardpoints had been installed. Work had begun on the fiberglass support structure for the ODS skin. The structure is approximately 30% complete in terms of assembly man hours. One problem required some minor redesign during the month. The weight of several major pieces (electronics base plates, bulkheads, GSE hardpoints) was greater than the weight of the TSU parts by a total of about four pounds. The GSE and crew handle hardpoints were redesigned slightly to recover the weight. At this point the total HSP weight is unchanged. Structural assembly has been a two man operation since early Novenber.

The engineering model multilayer board system controller assembly was completed (one board) and testing was partially complete by the end of the month. The detector controller multilayer board engineering model was received late in the month.

GSE software needed for capturing and displaying engineering data from major frame telemetry is now operational and serial data will be included in December. Instrument software (firmware) is now being debugged on the engineering model using the GSE.

There are still several electronic part shortages which threaten the flight electronics assembly and test schedule. The most severe of these problems reported last month has eased somewhat due to intense expediting. ITT has now promised completion of connector deliveries in December. If this commitment is fulfilled, schedule impact will be manageable. If further delays are encountered, there will be significant impact on both the electronics box assembly and test effort and the wire harness fabrication schedule. There have been several screening failures which have caused recent reprocurements or in some cases redesign to accommodate alternate parts having shorter delivery times. There are therefore several late arriving parts. Electronics assembly is proceeding without the missing parts in order to keep the assembly personnel working. When the parts arrive they will be installed in otherwise complete assemblies which will then be ready for test.

Flight unit PCDS assembly at Rockwell has been impacted by recent screening failures but delivery remains as planned due to workarounds.

Work at ITT was further delayed by the needs of other programs. Unit #5 has been repaired and is awaiting final test. Unit #6 is now being repaired.

There was a meeting at GSFC in November to review work on the thermal math models since CDR. The small model has been revised and now correlates well with the TSU test data. Agreement is generally within 1-2°C. The large (A.O. Smith - NASTRAN) model is also running on the GSFC computer and agrees rather well with the test data (1-3°C). The remaining major effort in the thermal area is to select the flight unit heaters and place the order with the vendor.

B. Schedule

Because of the uncertainties in delivery of several key electronic parts, a revised schedule is not included this month. The overall HSP flight unit schedule is in the process of revision to recognize the recent changes in calibration arising from the program rephase. Because delivery to VAP is planned for April 1983 instead of December 1981, installation of the final flight optical filters will occur in early 1983 rather than mid 1981. The reduction of test time prior to delivery to GSFC for acceptance tests from six months to three months will be applied to increased integration time and later structural and electronics completion dates. This will ease the impact of the current parts difficulties.

C. Problem Areas

The problems described in last month's report remain. The connector delivery problem is less pressing if present plans are executed by the vendor.

D. Science Section

No report.

E. Documentation

The preliminary ground data management and analysis SDD (PDL) for target verification was delivered in November. Flight software PDL will be delivered in early January.

F. CCB Activity

SI-C&DH ICD PIRN's	Action
059	Approved 11/10
060	Approved 11/10 with provisos enumerated in response 2200-739
063-068	Received 11/25

SI-OTA/SSM ICD PIRN's	Action
2120R1	Received from PE-no response requested
2121	Received from PE-no response requested
2123-2125	Received from PE-no response requested

STR-02 PSCN's	Action
2004	Approved 11/10

Don Johnson

DR-MA-02 Number 33
no longer includes SE-02
Issued: January 8, 1981

Monthly Report

for

December 1980

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Flight unit structure assembly continued in December with no significant difficulties. Completion of the preliminary fit-up is expected by mid-January after which the structure will be disassembled for painting and cleaning. Final assembly will begin in late January.

A problem in the system controller was discovered late in the month during tests of the wire wrap engineering model. The load on the 55114 line drivers from the redundant unit (powered off) exceeds the rating of the part. The problem can be solved by using the 55113 line driver in place of the 55114. This change will be tested in early January and,if successful, incorporated into the flight multilayer board design. A supplier has been found who claims to have an adequate quantity of 55113's in stock. Barring further complication, this problem will have no significant schedule impact.

The engineering model multilayer board detector controller was completed and tested in December. After a temperature test in early January, flight multilayer board production will begin.

Assembly of flight electronics continued, but completion will be delayed because of late part deliveries and slippage in the part screening schedule. The most serious problem is the delivery of the connectors, a few of which are still not received.

Flight unit PCDS assembly may be significantly impacted by recent part screening failures. A part failed screening in November and two alternative parts were procured. In late December both alternatives failed screening. It is not clear at this time what impact this will have on PCDS delivery.

Image dissector assembly flight unit #5 has been reworked and satisfactorily retested at ITT. It will be shipped in early January. Flight unit #6 was also reworked, but failed in acceptance test just prior to the holiday shutdown at ITT. The problem will be investigated in early January.

B. Schedule

Continuing problems with a few parts deliveries, screening completion, late screening failures, and reprocurement of failed parts are now impacting the completion of flight electronics. A detailed schedule cannot be made until some of the parts problems are solved. Other activities such as the structural assembly, software, multilayer board procurement, detector tests are proceeding according to the schedules maintained by GSFC and updated monthly. Completion of the flight unit and delivery to GSFC for acceptance tests are still planned for September 15.

C. Problem Areas

The major immediate problem is the late delivery of a few parts, especially ITT Cannon connectors. Another major problem is the failure of some parts in screening at this late date. The solution of these problems will be a major focus of our effort in January.

Another problem, perhaps in the long run more serious, is the C&DH simulator. The phase two simulator was installed and training conducted in December. There were and still are various hardware and software problems that prevent the simulator from operating as planned. These problems are being addressed by IBM and will in time be overcome, but even then the simulator will not be an easy tool to use for testing. The major problems are as follows:

1. 930R is not documented.

   We understand that version 4 is documented, but version 2 is what is used in the simulator. Either version 4 should be used or version 2 documented.

2. There is no way to write messages (in STOL) to the CRT or line printer.

   The only message capability is a comment in the line being executed, which is displayed on the CRT. Without a reasonable mechanism to send messages in PROCS to an operator, the test software cannot be made usable by other than a few trained operators (i.e. made idiot-proof). This will tend to increase the amount of on-site support during VAP and STAV.

3. The simulator is not easy to use.

   Our training demonstrated that there are few, if any, straightforward operations on the simulator. This tends to make it a tool that will be used by software specialists who invest a considerable time in learning how to use it. It will not be used by engineers and technicians as a test tool. Our present cost and schedule estimates do not include the impact of the difficulty of using the simulator.

D. Science Section

A team meeting was held at GSFC in December and was concerned primarily with flight operations.

E. Documentation

No report.

F. CCB Activity

SI-OTA/SSM ICD PIRN's	Action
2106R2	Approved 12/5
2126	Insufficient info. to act
2129	Approved 12/5
2130	Insufficient info. to act
2131	Not approved -- wording change requested

SI-C&DH ICD PIRN's	
063 - 068	Approved 12/3
062R2	Received 12/23

SS/ST Don Johnson file

DR-MA-02 Number 34
no longer includes SE-02
Issued: February 13, 1981

Monthly Report

for

January 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The preliminary fit-up of the flight unit structure was completed in January. The structure has been disassembled for completion of various machining operations, cleaning, and painting. The work continues as planned with no significant difficulties.

Several additional problems in the system controller and detector controller were discovered during tests in January. An error in sizing a pullup resistor, the need for a clock termination resistor, an oscillating line driver, and a data transfer timing problem were subjects of the trouble-shooting effort during the month. By the end of the month most of the problems had been identified and solutions proposed. The required design and software modifications will be implemented and tested in February prior to releasing the flight multilayer boards for fabrication.

The building of the flight electronics has been almost completely stopped due to delayed arrival of flight parts. The parts are late for two reasons: late deliveries from screening and screening failures requiring reprocurement of parts. Sufficient parts have been received to complete the Signal Distribution Unit (SDU) and Focus Amplifier (FA). Subsystem acceptance testing will begin in February.

Late parts deliveries have delayed the start of the flight unit PCDS fabrication at Rockwell. Several screening failures have led to reprocurement of various parts. The last parts are now expected to be screened and ready for assembly in February. One part will be used contrary to the advice of the GSFC parts branch. The ZN1066 (Feranti) voltage regulator completed screening, but had several problems: various functional failures, two fine leak failures, approximately 40% PIND failures, marginal construction analysis (one part had gold eutectic particles, one had a loose particle of glass), and evidence of voids in the package weld seal. Unfortunately, these results have come too late (early February) to cause a change in design or reprocurement of the part. This is particularly unfortunate since the parts were delivered to the screening facility in April and the x-rays were taken in June 1980. Schedule and cost constraints leave no choice but to use the best of the surviving parts.

The #5 flight unit IDT assembly has been received, but #6 will be delayed for several months. The problem in #6 was investigated in early January and found to be due to a loss of vacuum resulting from a cracked faceplate. Since there are no spare acceptable tubes at ITT, a new lot of tubes must be started. This is not expected to delay our schedule since the #6 unit is a flight spare. Sufficient quantity of image dissector tubes have been received for the flight unit.

GSE (electrical) is complete except for continued work on small revisions to correct minor problems as time allows. The mechanical GSE is complete except for painting.

Software continues on schedule except for flight (NSSC-1) software, which is being delayed by the SI C&DH simulator problems. IBM has scheduled a visit in February to investigate and correct some hardware problems.

Flight unit firmware development has been delayed somewhat by the recently discussed data transfer timing problems. Revisions in the software are being implemented and must be tested prior to burning the flight PROM's.

B. Schedule

While the structure and some software remain on schedule, the electronics schedule continues to suffer for lack of parts. It is not known what the impact of the parts problems will be until deliveries can be established for all outstanding parts. It is no longer realistic to state that the HSP PFU delivery to GSFC will be on September 15, 1981. While still possible, the continuing parts problems make the date increasingly unlikely.

C. Problem Areas

An increasing problem is parts deliveries. The major contributors as of early February are as follows:

1. Cannon connectors DAMA-11W1S. The manufacturer and distributor have now fumbled this one twice; once when the original order was placed in January 1980, and again when it was discovered in October that several part types were not entered properly by the distributor. In spite of high level management attention, this one part was missed again. It is now scheduled for delivery on March 13. It is needed for the PAD.

2. The coax pins supplied for several of the Cannon connectors were the wrong type. The correct type is past due to the distributor. Several analog electronics units require this part.

3. Erie capacitors (3904BBX5T102M and 3905BB327X7R192M) failed thermal shock (-55°C to +85°C) at Sperry. Parts have been returned to Erie for analysis. Delivery of replacement parts is TBD. The parts are used in the PMT and HVPS.

4. Fairchild CMOS IC 4067BDMQB, date code 8014. Large numbers of parts failed part burn-in functional tests, and construction analysis confirms faulty insulating layer. Parts cannot be used for flight. Replacement parts vendor and delivery date are TBD.

5. Intel 8224 failing functional tests, details not known. Replacement parts ordered and delivery is expected mid February.

6. Some failures reported in screening 26LS33's -- details not received to date.

7. The screening schedule is not under control. The status report of 1-30 shows delivery dates of 15 line items having slipped from the dates reported on 1-16. Projected screening completion dates have been generally unreliable.

Another problem area is the completion of testing on the engineering model (MLB version) of the system controller and detector controller. An effort is being made to ensure that all problems are promptly identified and fixed so that the flight MLB production can be started.

The C&DH simulator remains a problem as previously reported.

D. Science Section

Tests of the relay mirrors are planned for February. The mirrors will be subjected to various forces and various optical parameters checked. The purpose of this test is to verify that the mirrors will not change properties under the loading applied by the mount.

E. Documentation

The SI Qualification Plan review meeting presentation (GSFC January 27) should be regarded as an update to AV-01.

F. CCB Activity

An update to STR-02, dated 12 January 1981, was received during the month. This change incorporated SCN 37R1 and SCN 15R2 which were not previously received, reviewed, or approved by HSP. Paragraph 3.2.3.2.2, last sentence, incorrectly refers to "SCN 24".

STR-02 PSCN's	ACTION
29R3	Approved 1-30 (Previously approved by HSP RECP 0009 7-3-80)
2003	No response requested

SI-OTA/SSM ICD PIRN's	ACTION
2129R1	Approved 1-20

SI-SI C&DH ICD PIRN's	ACTION
062R2	Approved 1-13
8121	Submitted by HSP 1-23

5575 Don Johnson

DR-MA-02 Number 35
no longer includes SE-02
Issued: March 12, 1981

Monthly Report

for

February 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Final assembly of the flight unit structure was begun in February. Several minor machining operations were performed on parts after preliminary fit up disassembly. Cleaning, painting, and other surface treatments will be applied to the major pieces prior to final assembly. There have been no major difficulties.

Continuing problems with the system controller have further delayed the release of the flight unit multilayer boards. One timing problem required a small change in the board layout and another problem was caused by oscillating line drivers. In discussions with the manufacturer of the part (AMD 26LS31) it was determined that the lines must be terminated, although this was not stated on the data sheet. The termination resistors will be incorporated by adding a small PWB in each detector controller. Barring further problems, the flight MLB's will be released for production in mid March and should be delivered by early May. Flight firmware has been coded, debugged, and informally tested. Testing will continue in March.

The system controller problems have also delayed the start of flight analog electronics subsystem acceptance tests. The first test procedures are in review and testing is expected to begin in March.

While some progress has been made in the electronics parts area, additional screening failures have occurred. Fortunately in most cases it has been relatively easy to locate replacement parts promptly. Completion of the HVPS and PAD is still pending parts deliveries.

The parts status is as follows:

1. 4067B (Fairchild): Failed post burn-in functional. Replacement parts ordered from RCA, delivery expected mid March.

2. 54LS373 (AMD): Failed post burn-in functional. Replacement parts obtained from TI and delivered to Sperry for screening.

3. Erie capacitors (3904, 3905 HV ceramic): Failed thermal shock. Replacement parts now being manufactured by Erie, delivery expected in early April.

4. Intel 8224: Failed functional test, replacement parts now at Sperry in burn-in.

5. TI55113: Original lot still being screened.

6. Intel 3636 PROM's: Environmental screening tests complete. Awaiting final flight firmware.

7. Cannon connectors: Short one part type and one coax insert type.

8. Intel 8257: Failed high temperature functional. Parts being reprocured, delivery TBD.

9. Seven line items still in qualification test at Sperry, screened flight parts delivered to Wisconsin:
LM161, 8228, 54LS197, MC1568, 91L24, 8212

Rockwell has encountered a problem with one of the screened relays and now plans to use a marginal screening reject (bounce time slightly over the allowed limit) in the second unit.

ITT now projects delivery of the last IDT assembly to be June 15.

Flight unit wire harness assembly continues using the TSU as an assembly fixture. The few connector items still missing are not seriously impacting progress at this point.

B. Schedule

The continuing system controller and parts delivery and screening problems have kept the schedule from becoming firm. While we are still working to a September 15, 1981 completion date, there is no margin left. A firm schedule cannot be established as long as the required parts deliveries are uncertain.

C. Problem Areas

The two major problems are parts and system controller MLB release as detailed above.

IBM has incorporated modifications of the C&DH simulator hardware that may have helped cure the problems previously reported. However, there has been no time available to exercise the simulator since the modifications were made.

D. Science Section

Relay mirror tests confirmed the design and revealed no additional problems.

E. Documentation

No report.

F. CCB Activity

STR-02 PSCN's	ACTION
33R1	Information only copy
2003	Approved by GSFC without HSP concurrence. (Acceptable to HSP)
40	Approved 2/27/81 (previously approved 6/27/80 in letter 2200-630)

SI-OTA/SSM ICD PIRN's	ACTION
2127R1	Information only copy
2130R2	Information only copy
2134R1	Not approved 2/18/81
2122R1	Approved by GSFC without HSP concurrence. (Acceptable to HSP)

SI-C&DH ICD PIRN's	ACTION
8116	Received 1/23/81
8116R1	Received 1/26/81
8116R2	Received 2/12/81
8117R1	Approved 2/3/81
8119	Approved 2/3/81
059R1	Not approved 2/18/81
074	Approved 2/3/81

DR-MA-02 Number 36
no longer includes SE-02
Issued: April 6, 1981

Monthly Report

for

March 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Because of the increased project concern about weight a thorough internal audit of the HSP weight budget was performed in March. Each item in the weight budget was matched to specific assemblies and drawing numbers. Existing hardware was reweighed. The list of items in the weight budget was changed somewhat to better match the subassemblies as built. The revised weight budget was submitted on April 1. The revised HSP weights are:

Predicted Launch Weight	598.68
Required Contingency	3.78
Present Weight	594.90
Present Contingency	5.10
Launch Weight Limit	600.00
Actual or Spec. Weight	536.40 (90.2%)

An LMSC weight audit is scheduled for May 18.

Some additional machining was performed on the forward and aft bulkheads to remove weight since this was the last opportunity to do so prior to final assembly. The major structural pieces were painted, irridited, or R-5 processed during March. Assembly work continues and is now expected to be complete in May. The additional time is due to a revised optical bench alignment scheme, some delays in getting the painting facility ready, and time spent reducing the weight of the bulkheads. No major problems have been encountered in assembly and none are anticipated.

The flight multilayer boards were released for production in March. All known problems were resolved and effort turned to revision and release of the system controller specification and test procedure. Testing of the flight firmware was completed and preliminary PROM listings were sent to Sperry (with UV EPROM's for verification of the program) so that they can prepare their test equipment for final screening of the 3636 PROM's, now expected to be burned and delivered by May 1.

Acceptance tests have begun on the deflection and focus amplifier. The status of flight electronics is as follows:

Deflection and Focus Amplifier	Assembly complete, testing started.
Preamp	Assembly complete, testing awaiting PAD.
PAD (Pulse amplifier/discriminator	Assembly complete except for one Cannon connector (DAMA-11WIS) now expected in early April.
Current to Voltage Converter	Assembly complete, testing will begin in April.
Signal Distribution Unit	Assembly complete, test procedure being written, will complete in April.
High Voltage Power Supply	Assembly complete on some units except for one Erie capacitor -- non-flight capacitor being used for prepot tests--expect capacitor in

	April. Remaining units being assembled, will be complete in April.
Detector Controller System Controller	Awaiting MLB, CD4067, 3636, 8257, 8228, 54LS373, AD562

The major parts problems are as follows:

1.	55113	Large screening dropout left barely enough parts to complete flight hardware. Additional lot sent to Sperry for screening.
2.	4067	Original lot failed screening, replacement parts expected in early April.
3.	AD562	Original lot failed screening. Replacement parts sent to Sperry for screening, expect completion in late April.
4.	54LS373	Original lot failed screening. Replacement lot at Sperry and expect complete in late April.
5.	Erie capacitor (3904, 3905)	Original lot failed screening, replacement parts expected from Erie in early April.
6.	8228	Original lot failed screening, replacement lot at Sperry, expect completion in mid April.
7.	Cannon connector (DAMA-11WIS)	Expect delivery in early April.
8.	8257	Original lot failed screening, replacement parts ordered.

Assembly of the flight PCDS units at Rockwell has begun and delivery is now expected in June.

Vibration testing of a flight PMT in March resulted in a broken tube. The glass bottle broke, apparently due to the inner assembly impacting the glass. Analysis of the PMT mounting configuration suggests that the failure was caused by an unfortunate coincidence of natural frequencies. The natural frequency of the PMT mounting hardware was about 600 Hz, which is also the approximate natural frequency of the PMT inner structure. The amplification factor of the mounting hardware alone was over 40. The mounting configuration is being redesigned to increase the natural frequency and thereby separate it from that of the tube. The new design will be tested in April.

B. Schedule

Schedule remains dependent on the few remaining problem parts. We are still working toward the September 15, 1981 completion date.

C. Problem Areas

The major problem is parts deliveries and obtaining replacement parts for those that failed screening.

The C&DH simulator has been exercised since the latest IBM field modification and appears to function. A thorough test cannot be made until our data base update has been received. A revised data base was submitted prior to April 1 so the revised tape is expected from IBM on April 15.

D. Science Section

The PMT has been moved further forward to minimize the blockage of the IDT caused by the PMT pick-off mirror (beam splitter). This relocation is unrelated to the vibration problems discussed earlier, but will provide a lower vibration environment. The new location is under the forward IDT bracket.

E. Documentation

A revised SI-C&DH ICD HSP Unique Appendix incorporating IRN's 069-073 was submitted in late March.

A revised weight budget (SE-02) was submitted on April 1.

F. CCB Activity

SI-OTA/SSM ICD PIRN's	ACTION
2117R4	Approved 3/13 with comments in letter 2200-771
2133	Approved 3/13

SI-SI C&DH ICD PIRN's	ACTION
8116R2	Not approved 3/12
8120	Approved 3/17

SI-C&DH IRD PSCN's	ACTION
10001	Approved 3/16

55/54
D Johnson

DR-MA-02 Number 37
no longer includes SE-02
Issued: May 6, 1981

Monthly Report

for

April 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

A revised power budget submitted in April shows only minor changes due to incorporation of electronics subsystem test data. Both power and weight continue to be within required limits. The LMSC weight audit has been rescheduled for June 25.

Final assembly of the flight structure continued with no major problems in April. This work will continue in May until the ODS baseplate to HSP structure alignment is performed late in the month. After ODS baseplate alignment is complete the structure will be transferred from the assembly fixture to the dolly for the final assembly steps.

The last Canon connector arrived in late April after intensive expediting. The PAD assembly was completed and the subassemblies were ready for test by the end of the month. The Erie capacitors were received early in the month and were forwarded to Sperry for screening. Screening is expected to be completed by early May, which will allow the HVPS assembly to be completed. Once the HVPS is complete, all analog electronics will be complete and ready for test.

The multilayer (MLB) boards are now expected in late May. The MLB specification was reviewed recently by GSFC and two recommendations were made. These two items were incorporated in our requirements to the MLB manufacturer. Assembly of the digital electronics is expected to begin in June after receipt of the MLB's. All parts have been received from the manufacturers except the replacement lot of 8257's from Intel. There are several parts remaining in process at Sperry.

Flight PROMs will be burned in mid May after release of the System Controller specification and acceptance test procedure. The test procedure will be verified on the engineering model prior to release.

The PMT mounting feet were redesigned and a vibration test was conducted at GE near Milwaukee. The tube survived the test and the higher natural frequency was verified. Details of the problem, design change, and test are contained in an appendix to this report.

B. Schedule

Because most of the outstanding parts have been received it is now possible to schedule the work remaining prior to delivery of the HSP PFU to GSFC for acceptance tests. The major milestones of the revised schedule are as follows:

22 May	ODS baseplate alignment complete
22 May	IDT tests complete
1 June	Analog electronics assembly complete
1 June	MLB received
15 June	ODS wiring complete
15 June	Clean room operational
15 June	PFU wire harness installation start

17 July	PFU wire harness complete -- begin electronic integration
17 August	PFU integration complete -- begin final tests
20 July	System Controller #1 test complete
17 August	Detector Controller #5 test complete
15 September	PFU tests complete -- ship to GSFC for acceptance tests

This schedule depends on receipt of the Erie capacitors in early May and the 8257's by mid May.

C. Problem Areas

RIU B fails to respond to several HSP discrete commands when sent from the C&DH System Simulator. A PTR will be sent in early May.

The RIU's have 3V peak (10-14 microsecond) pulses on the STBY II output when the RIU is in standby and the other RIU in action. These extra pulses (10 per minor frame which correlates with the telemetry requests) cause a multiplexer in the HSP to toggle. The problem was just recognized at the end of the month. To date there is no indication of misapplication of the RIU, but IBM and GSFC will be asked to review all the data.

D. Science Section

The next Team Meeting, scheduled for June 8 and 9 has been cancelled because of the change in date of the ST Quarterly Review at MSFC. If possible the meeting will be rescheduled for late May.

E. Documentation

A revised power budget was submitted in April.

A preliminary version of the HSP Flight Software Design Document (DM-05 C) and an updated Ground Data Management and Analysis Software Requirements Document (DM-03) were submitted during the month. The first delivery of flight software code was made in late April.

F. CCB Activity

SI-OTA/SSM ICD PIRNs	ACTION
2135	Approved 4/23

Space Telescope High Speed Photometer

PMT Random Vibration Test Summary

May 8, 1981

Introduction

This report details the Random Vibration qualification test results of the ST/HSP Photomultiplier Tube (PMT). The PMT used by the HSP is the Hammamatsu R666S. To date the HSP has tested three Hammamatsu PMT's in random vibration: an R928 tube (similar to the R666S electrically) and two R666S tubes. The first two random vibration tests (R928 and R666S) resulted in catastrophic failure of the tubes. Post test failure analysis and a study of tube and mounting structure resonances led to a mounting design change that proved to be successful.

The third PMT tested in random vibration, an R666S, was mounted using the new design configuration and survived the test without mechanical failure. Comparison of dark current levels and the response to a calibrated light source measured before and after the random vibration test showed no degradation of tube performance. Based on the results of this third vibration test, the Hammamatsu R666S PMT mounted in the new design configuration has been qualified for flight use by the HSP.

Random Vibration Test Levels

The random vibration test levels for the PMT are shown in Figure 1. This power spectral density curve was defined by adding 3 dB to the enveloped spectral response of an accelerometer (positioned at the location of the PMT) during the HSP TSU acoustic test. The rms acceleration experienced by this accelerometer during the acoustic test was 4.4 grms. Figure 1 indicates that the enveloped test level acceleration level is 24.3 grms.

The test level is applied to the PMT in three mutually perpendicular directions for 2 minutes per axis for a total of 6 minutes.

Physical Construction of the Hammamatsu R666S Photomultiplier Tube

Figure 2 illustrates a cut away view of the Hammamatsu R666S PMT as received. The dynode structure is held together at each end by porcelain retainers. This dynode structure is supported by 12 0.032 inch wires that feed through the glass bottle and then connect to the pins of the octal base. The top porcelain retainer is separated from the glass bottle by springs.

HSP Potted Assembly for the Hammamatsu R666S

Figure 3 illustrates the method used by the HSP to mount the Hammamatsu R666S tube in a protective can. A high voltage shield is positioned between the tube and the can. A resistor network and cable leads are soldered to the pins of the octal base (not shown). This whole assembly is then potted with Scotchcast 22 as indicated in the figure. The protective can provides a mechanical interface for the mounting feet of the PMT assembly.

Test History and Evolution of Design

Three Hammamatsu PMT's were tested to the random vibration test levels of Figure 1. For each test the PMT's were potted in the protective can and the can was supported on mounting feet. The first test was performed on a Hammamatsu R929 PMT and the second and third tests were performed with R666S tubes. The following is a detailed description of the test events of the three random vibration tests.

Test #1
Hammamatsu R928 PMT
Date of Test: 3/4/81
Performed at GSFC Vibration Facilities
Test Conductor: Don Hershfield (GSFC) and Fred Best (UW)

The R928 PMT was intended only to test the HSP potting procedure. At no time was this tube meant to serve as a vibration qualification specimen for the R666S tube. It was tested in vibration only as a practice run for the R666S test.

The physical configuration of the mounting structure for this vibration test is illustrated in Figure 4. This tube survived 2 minutes in the X direction, but failed sometime during the 2 minute Y direction test.

Even though it was known that the R928 was mechanically different from the R666S and that this tube was being used as a dry run test, it was felt that the vibration test failure should be investigated and the mechanism of failure well understood before proceeding to the testing of the R666S.

Investigation of the failure showed that all of the support wires fatigued and separated at the point where they interface with the bottom of the glass bottle. The dynode structure, now free to move, fractured the glass bottle. The investigation also showed that the R928 tube support wires were significantly smaller in diameter than those of the R666S. At this point a simple analytical model of the dynode structure and the support wires was constructed. This model predicted that the smaller diameter R928 support wires would fail in fatigue, but that the larger diameter R666S wires would not, under the test levels of Figure 1. The model also predicted that the lateral natural frequency of the R666S dynode structure suspended on the support wires would be about 600 Hz. Data from Hammamatsu Co. corroborated the 600 Hz prediction. This correlation between model and Hammamatsu data added credibility to the model, giving confidence to the prediction that the R666S support wires would not fail. For this reason it was decided to test the R666S with no change in mounting configuration.

Test #2
Hammamatsu R666S PMT
Date of Test: 3/26/81
Performed at GSFC Vibration Facilities
Test Conductor: Don Hershfield (GSFC) and Fred Best (UW)

The configuration for this R666S PMT test was the same as that illustrated in Figure 4. The test levels were those of Figure 1. A slightly different internal packaging scheme was used where the PMT was potted without the high voltage shield and the pins at the base of the PMT were left exposed so that a simple electrical function test could be performed at 30 second intervals during the test; therefore, if a failure occurred the survival time could be more accurately determined. The flow chart of the test sequence is illustrated in Figure 5.

This tube survived 30 seconds in both the X and Z axis, but failed sometime during the first 30 seconds of the Y axis test.

To aid in the failure diagnosis it was decided to do a resonance survey of the PMT assembly. This test was performed by placing a tri-axial accelerometer on the front of the PMT protective can and measuring the response to a very low level broad band input spectrum. The test was run in each of the three axes. The results of this test showed that the mounted assembly had structural resonances of 1720 Hz in the X direction, 605 Hz in the Y direction and 635 Hz in the Z direction.

Inspection of the failed R666S PMT showed that the support wires were still intact as predicted. The failure resulted from the upper porcelain retainer of the dynode structure striking and fracturing the glass bottle. Even though the tube had failed, the fact that the wires had not fatigued was encouraging.

The resonance of the mounting structure in the Y direction had the same natural frequency (600 Hz) as the dynode structure suspended laterally on the supporting wires. The direct coupling of these two modes resulted in excessive amplitudes of the dynode structure, which caused failure. The natural frequency of the dynode structure in the X direction is also 600 Hz (all lateral directions of the dynode structure are symmetric). However, no failure resulted in the X direction test because the mounting structure resonance (1720 Hz) is widely separated from the 600 Hz dynode structure natural frequency. The Z direction test does not excite the lateral 600 Hz dynode structure mode so the 635 Hz mounting structure resonance in the Z direction did not cause failure.

Because the wires did not fatigue and because the X axis test was successful, it was concluded that failure could be avoided in the Y direction by increasing the natural frequencies of the mounting structure in the Y direction to at least 1720 Hz (i.e. so that a similar situation as in the X direction would result).

Test #3
Hammamatsu R666S PMT
Date of Test: 4/25/81
Performed at General Electric Medical Products Division, Milwaukee, WI
Test Conductor: Scott Mensell (GE) and Fred Best (UW)

The resonances of the mounting structure for the PMT assembly were increased for this test. The purpose of this was to reduce coupling between the 600 Hz lateral dynode structure natural frequency and the lateral (X and Y) structural mounting resonances.

The resulting design change is illustrated in Figure 6. Again the PMT was potted without the high voltage shield and with the pins at the base of the tube exposed to facilitate electrical function tests at 30 second intervals during the test. The flow chart of the test sequence performed is illustrated in Figure 5. The test levels remained the same as in the previous two tests (see Figure 1).

The results of this vibration test were successful. The R666S tube survived the full 6 minute test sequence with no failure. Close post test visual inspection showed that an internal spotweld had failed in a non-critical area. It is not clear whether the spotweld was intact prior to the test. Complete electrical function tests showed that tube performance was not changed as a result of the vibration test.

Planned Additional Tests for the Hammamatsu R666S

The HSP has procured three additional Hammamatsu R666S PMT's. Because the tube has been qualified in random vibration, only acceptance level tests are planned for these three tubes.

At present the acceptance tests will consist of two steps. First, a 30 second per axis random vibration shake to the levels of Figure 1. This test will be performed with the tubes configured as in test #3 (i.e. the PMT will be potted without the high voltage shield and with the pins at the base of the tube exposed to facilitate electrical function tests). The second part of the acceptance test will be done only on the completed tube assemblies. This part of the acceptance test will consist of a 30 second per axis test (at the levels of Figure 1) with the PMT's in the full flight configuration (i.e. with a high voltage shield, soldered resistor network, and cables potted with the PMT).

The first part of the acceptance test is intended to screen out a possible faulty tube. The second part will ensure that the very slight difference in full flight configuration has no effect on tube integrity, and will also serve as an assembly workmanship test.

PMT Random Vibration Qual. Test Levels

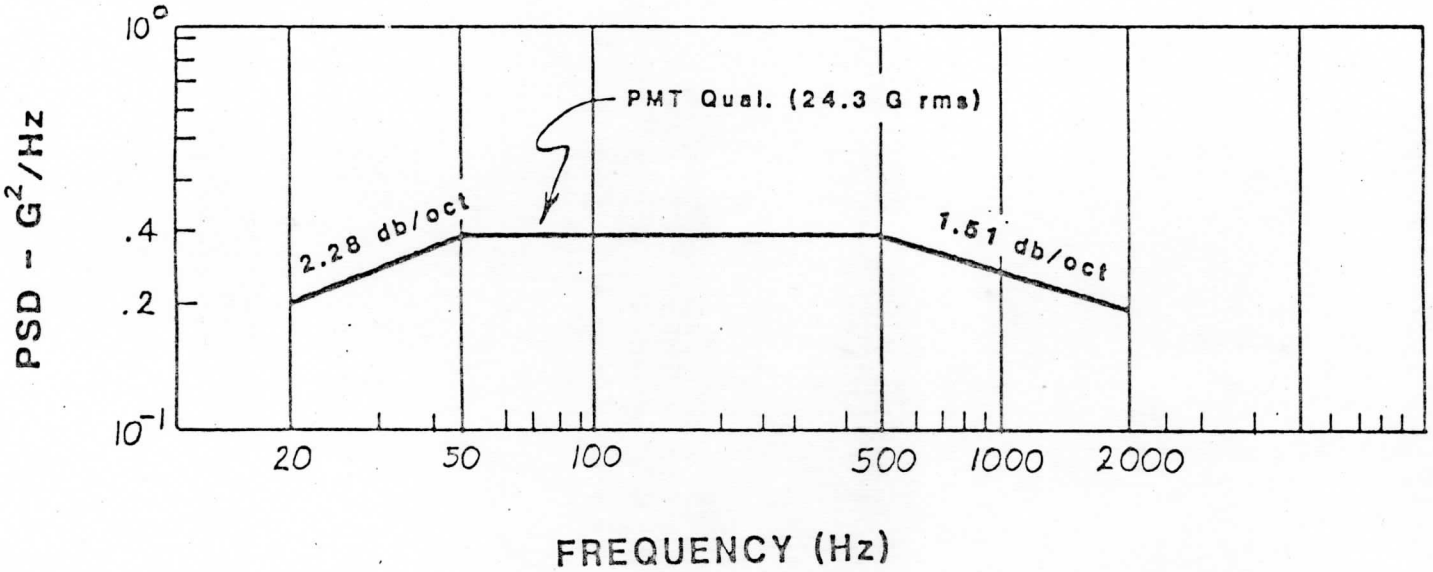
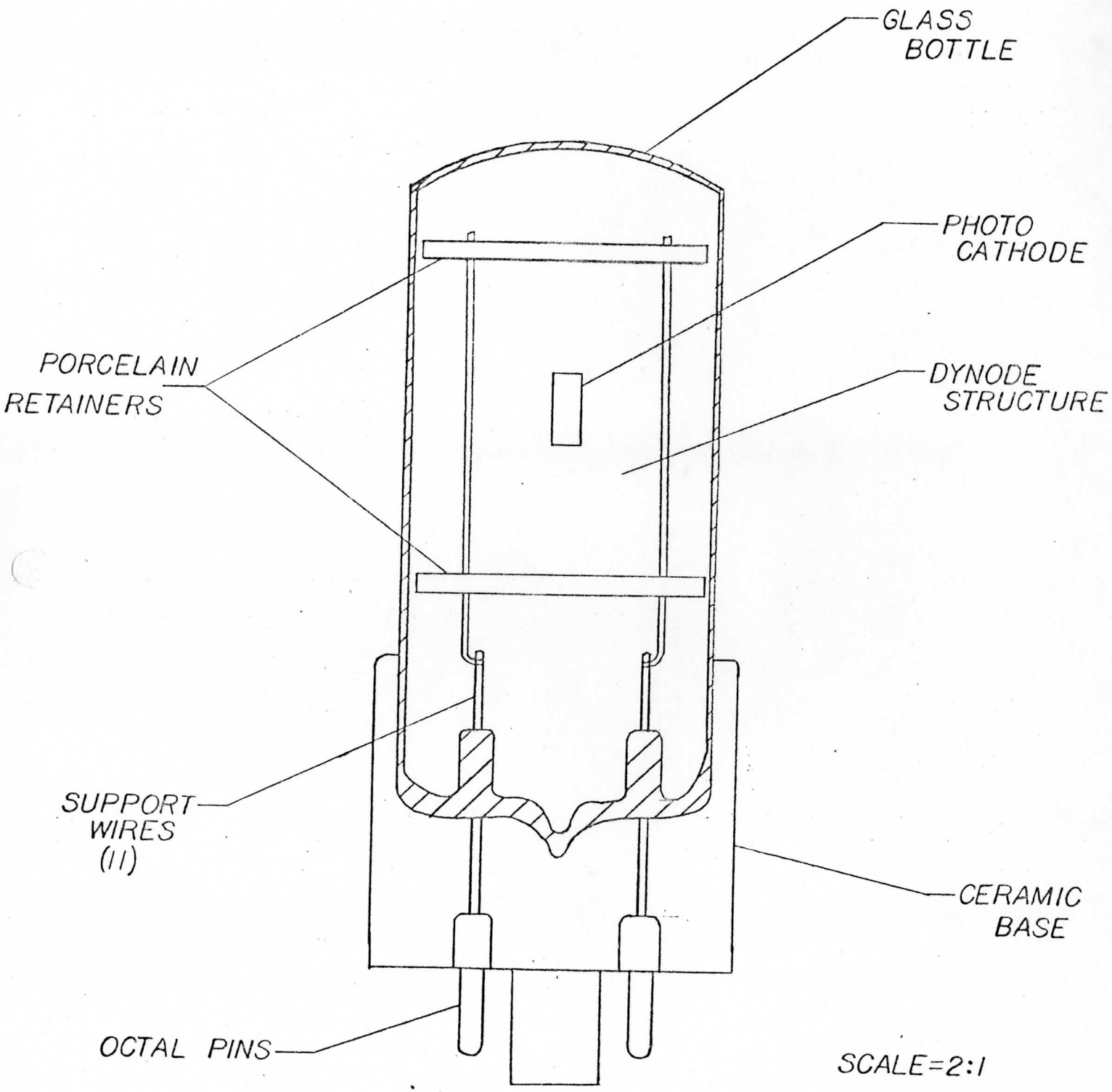
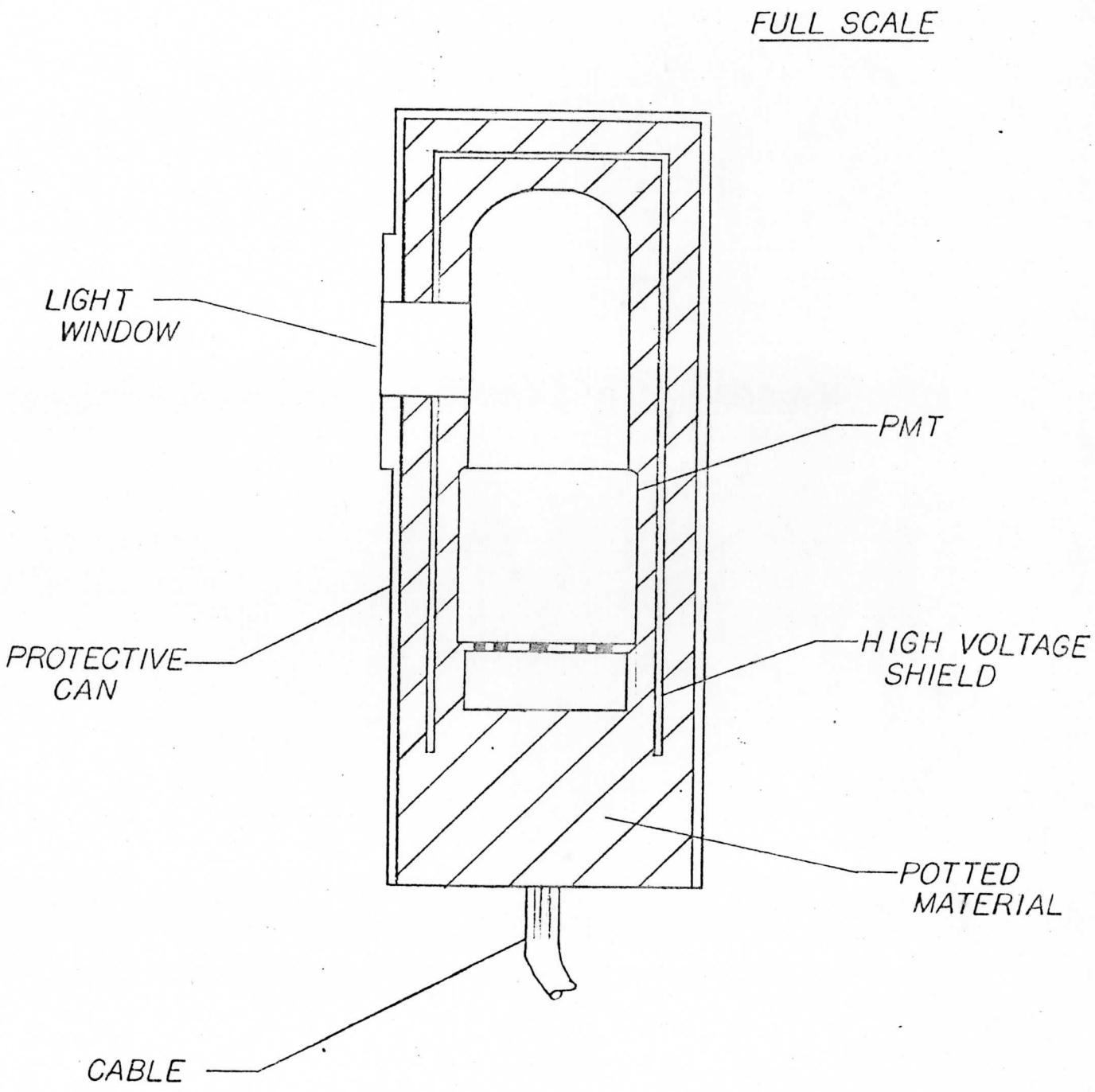


FIGURE 1



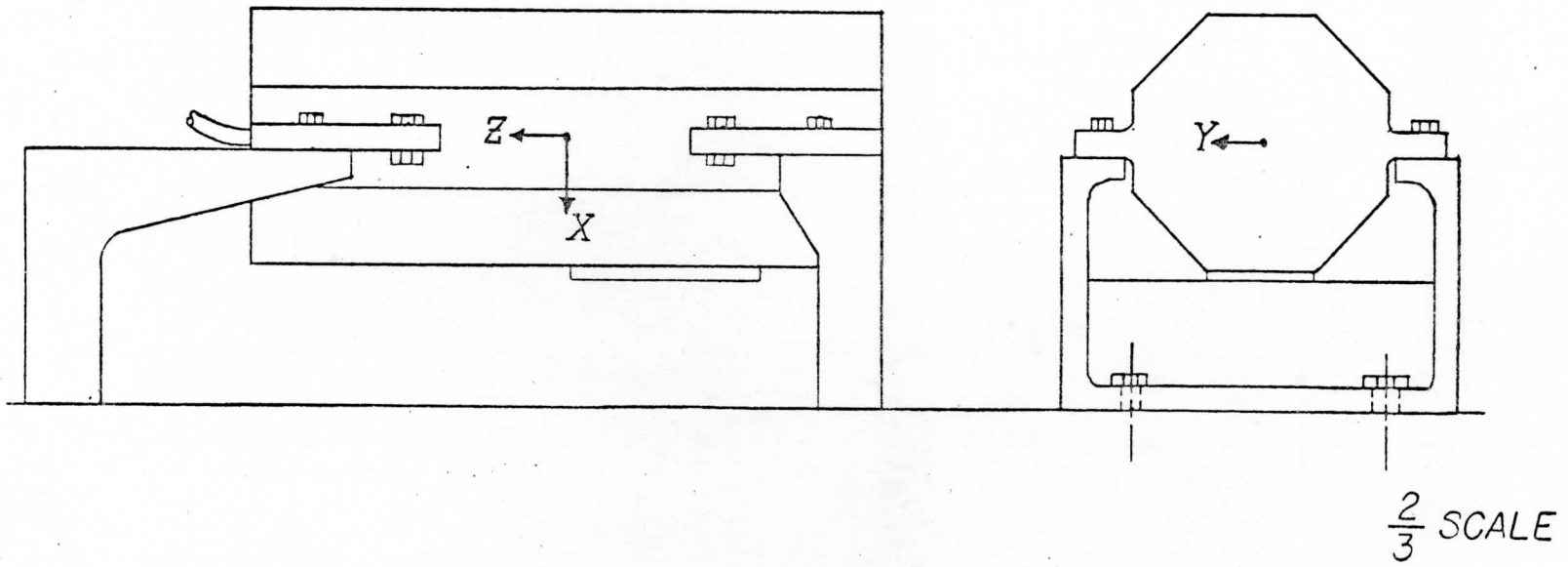
HAMMAMATSU R666 PMT

FIGURE 2



PMT POTTED ASSEMBLY

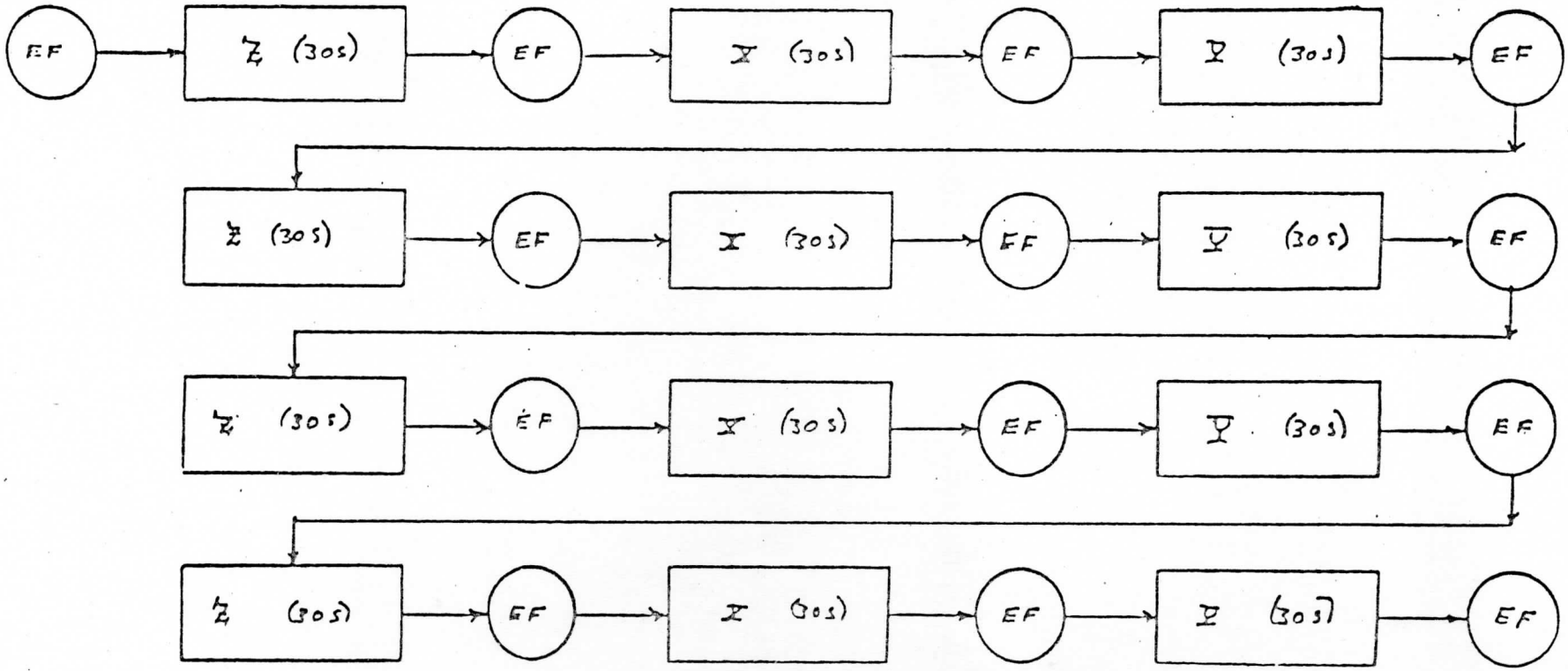
FIGURE 3



MOUNTING STRUCTURE FOR TESTS 1 AND 2

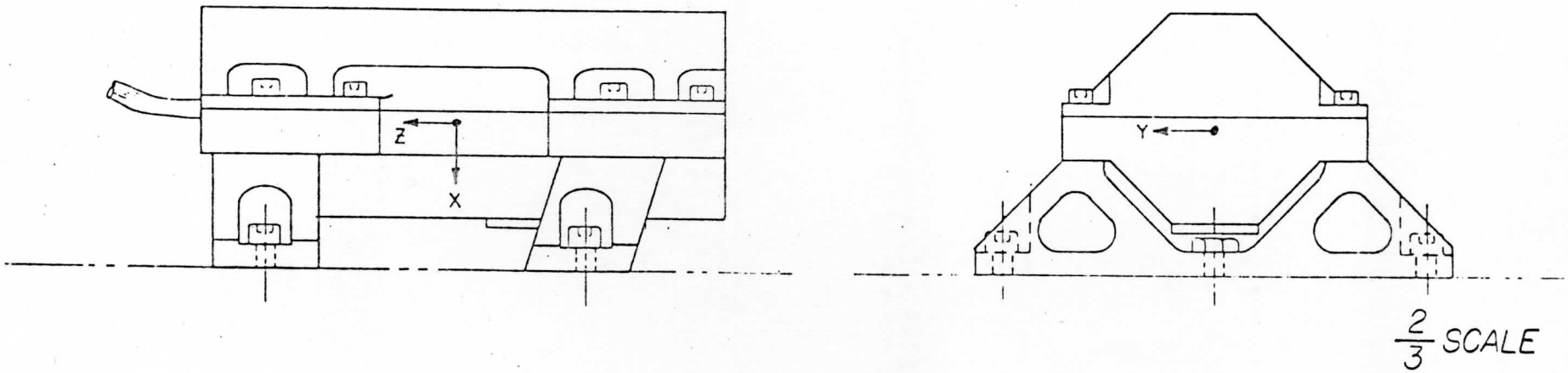
FIGURE 4

ST - HSP PMT Random Vibration



EF ⇒ Simple Electrical Function Test

FIGURE 5



MOUNTING STRUCTURE FOR TEST 3

FIGURE 6

Don Johnson

DR-MA-02 Number 38
no longer includes SE-02
Issued: June 5, 1981

Monthly Report

for

May 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Alignment of the ODS baseplate to the structure was completed in late May. The remaining work on the structure will continue in June. The forward and aft bulkheads must be painted and cured prior to moving the structure to the dolly. No major difficulties have been encountered in the structural assembly operations and none are anticipated. After the structure is completed it will be subjected to a final cleaning operation and moved into the class 10K cleanroom for final wire harness installation.

The wire harness has been removed from the TSU in preparation for installation into the PFU. The TSU was removed from the cleanroom for rework for the SI latch test program at GSFC. The cleanroom cleaning was started to bring the room into full class 10K operation by mid June.

The Erie capacitors for the HVPS did not arrive until late in the month, but one HVPS was completed, potted, and ready for test by the end of the month. The remaining units were being completed, but will not be potted until the test of the first unit is complete.

The detector controller multilayer boards (MLB) arrived late in the month and assembly began immediately. Test coupons of each MLB were sent to GSFC for analysis and all were good. Assembly cannot be completed untl a few parts are received from screening, which are now expected by mid June.

The system controller MLB is expected in early June. The flight PROM's have been programmed and sent to Sperry for screening.

The first delivery of flight (NSSC-1) code was sent to IBM and preliminary comments have been received.

The RIU standby II pulse problem was further analyzed in early May and is definitely an RIU design problem. The pulses appear when all connections to the "off" RIU are removed except the supervisory and reply busses.

B. Schedule

The late arriving capacitors delayed completion of the HVPS by approximately two weeks. IDT testing is taking longer than estimated, but is progressing. Completion of the PFU structure is somewhat behind the schedule reported last month, but is also progressing.

C. Problem Areas

The RIU B command problem reported last month was due to a command input being connected to chassis by mistake in the HSP EM. The problem has been fixed and the PTR withdrawn.

The RIU standby II pulses are an RIU design problem as previously reported.

There are four new PTR's on the C&DH system simulator:

1) The simulator cannot command the SI on/off because presently the SI must be on before the simulator is turned on (IBM design change 34),
2) "Pass term" does not clear error from a previous pass; the system must reboot,
3) the bus coupling unit (BCU) does not function,
4) time-tagged messages at screen bottom are not kept in chronological order; each time-tag must be examined to determine the order of events.

Delivery of the flight latch fittings from PE is a problem if delayed beyond August 1. The latches are required for HSP acceptance tests.

There is still no interface definition of any SI alignment/installation verification devices.

D. Science Section

A team meeting was held on May 26 and 27. The major topic of discussion was orbital verification of the HSP. The next team meeting is tentatively scheduled for August 13-14.

E. Documentation

The July 1 weight budget is being prepared early to be available for the MSFC/LMSC weight audit scheduled for June 25.

F. CCB Activity

SI-OTA/SSM ICD PIRN's	ACTION
2139	Approved 5/4

53/ST
Don Johnson
file

DR-MA-02 Number 39
no longer includes SE-02
Issued: July 8, 1981

Monthly Report

for

June 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

PFU structure assembly continued in June with no major problems, but several minor difficulties were encountered that delayed progress. By the end of the month the outer skin support was being assembled. The major task remaining is the painting of the forward and aft bulkheads to comply with the ICD change to high alpha surfaces.

Progress on the wire harness is now slowed until the structure is complete. During June the tape that was determined to be unacceptable during the contamination audit was replaced with an approved tape. Wiring of the ODS has begun and will continue in July.

The high voltage power supplies were completed and tested in June. Each HVPS will now be subjected to a 240 hour thermal vacuum test. This test is being conducted in parallel with other HSP test and integration activities because there are sufficient spare units.

The PAD-preamp-CVC acceptance tests will begin in early July. These tests require much of the equipment used in the HVPS acceptance tests, which were completed late in the month.

The detector controller assembly is progressing on schedule and system controller assembly has begun. All parts have been received except the 3636 PROMs and the 4067's, which are expected in July.

One (S/N 3) IDT was found to be noisy during testing and was returned to ITT for analysis. The last IDT from ITT (the spare UV tube) has not been delivered, the delay being due to other priorities at ITT. It is now expected by the end of July.

A major effort to write C&DH simulator test procedures was made in June. An additional programmer was added to the staff whose only job is to support C&DH simulator software activities. Progress has been slow due to the large number of problems encountered. Numerous PTRs were written and submitted during the month. Attempts to run NSSC-1 applications processors have so far been unsuccessful. Communication with other simulator users and IBM on these problems has increased.

B. Schedule

Because of the delay in completion of the flight structure, the assembly and intergration is expected to be completed in mid September. The flight RIUs are not expected now until October 1, so October 15 is the current expected ship date to GSFC. This depends on receipt of latch fittings from PE by July 30 and flight RIUs by October 1.

C. Problem Areas

The continuing difficulty with the C&DH simulator is a significant problem, which is expected to remain with us for several more months.

Delivery of flight latches (July 30) and RIUs (October 1) will be a problem if delayed beyond presently projected dates.

There are still no interface definitions of any SI alignment/installation verification devices.

D. Science Section

An assessment of the impact of degraded PCS/FGS performance was submitted to the project during the month. Work has begun to organize a list of HSP observation candidate stars. The next team meeting is scheduled for August 13-14 in Madison.

E. Documentation

A revised weight budget was submitted on July 1. (The June weight audit was performed using the July 1 report information).

F. CCB Activity

The captive bolt PIRN was approved and incorporated without the HSP DAR (PIRN 2143). Therefore, we are in violation of the ICD until PIRN 2143 is approved (UW letter 2200-832). PIRN 2134R2 was approved by the GSFC CCB without our review and contrary to the comments submitted in response to PIRN 2134. ICD IRNs 1921 were received in June, but IRN 18 was never received. Other CCB activity was as follows:

STR-02 PSCNs	Action
2009	Approved 6/17
2010	Approved 6/17

SI-OTA/SSM ICD PIRNs	Action
2131R1	Revised at Thermal TIM, LMSC-- comments reserved until receipt of revised PIRN
2111R4	Approved 6/30
2144	Approved 6/17
2151	Approved 6/17
2152	Disapproved -- PIRN revised at Thermal TIM, LMSC
2153	Approved 6/30

C&DH ICD PIRNs	Action
8116R3	Approved by GSFC without HSP review -- incorporates HSP comment on 8116R2.
8126	Submitted by HSP 6/16
8126R1	Submitted by HSP 6/30

SS/ST Don Johnson

DR-MA-02 Number 40
no longer includes SE-02
Issued: September 2, 1981

Monthly Report

for

July/August 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The PFU structure was completed in August and moved into the cleanroom for final cleaning and wire harness installation. The structure was weighed prior to being moved and was within the weight predicted by the weight budget.

The ODS wire harness was completed in August. The ODS will be disassembled for final cleaning and painting prior to reassembly for alignment.

All flight electronics parts have been received and all electronic PWB subassembly is complete. The only electronics assembly work not complete is the detector controller conformal coat and box installation and the system controller PWB/connector assembly.

The HVPS long term (240 hours) thermal vacuum test was begun in July. The first unit failed due to corona near the high voltage connector. The adhesion of the potting to the connector was not sufficient to prevent a gap from developing after several thermal cycles. The connector will be replaced, repotted, and retested. A second unit exhibited similar failure, which could not be repeated subsequently.

Two problems have occurred during the analog electronics tests (preamp-PAD-CVC). One was a turn-on stability problem that was corrected by the addition of a diode and a change of resistor. The second problem is the failure of the PAD threshold stability to meet specification. The problem occurred just prior to the end of August; consequently the corrective action has not yet been determined.

The last IDT has not been delivered from ITT due to a failed corotron. Delivery is now expected in October. One IDT was returned to ITT for repair of a shorted focus coil lead. ITT has agreed to repair the unit free of charge even though the unit is out of warranty.

Engineering model tests of the pulse counting mode of the IDT have shown the need to modify the grounding scheme to reduce noise pickup. The anode shield must be bypassed to the IDT case near the IDT. The implementation is now being worked out. (This is the noise problem that was attributed to the S/N 003 IDT in the June report).

The PCDS was delivered by Rockwell in early July. Both units had functional failures that were corrected, but both units have been returned to Rockwell for repair or rework of numerous quality deficiencies.

Progress is being made in writing test software for the C&DH simulator. There are still many problems to overcome, but the rate of accomplishment is improving.

The TSU was modified to incorporate the current point C interface, weigh 700 lbs, and provide an adjustable CG during the reporting period. Preflight A and B latches were installed with assistance from PE. The TSU was delivered to GSFC on August 25 for the latch test program.

B. Schedule

The PFU schedule was delayed by the TSU rework and delivery. The GSFC STSOP directed that the TSU be given priority in order to meet the latch test schedule. The TSU and the various problems have slipped the PFU ship date to the second half of November. The present schedule is attached. This schedule depends on RIU delivery on October 1 and latch delivery by October 26.

C. Problem Areas

The HVPS connector-potting adhesion problem, the PAD threshold problem, the IDT noise problem, and the PCDS workmanship as discussed above are the major areas of concern.

There is still no interface definition of any SI alignment/installation verification devices.

D. Science Section

A team meeting was held August 13-14 in Madison. The major topic of discussion was the ST Design Reference Mission.

E. Documentation

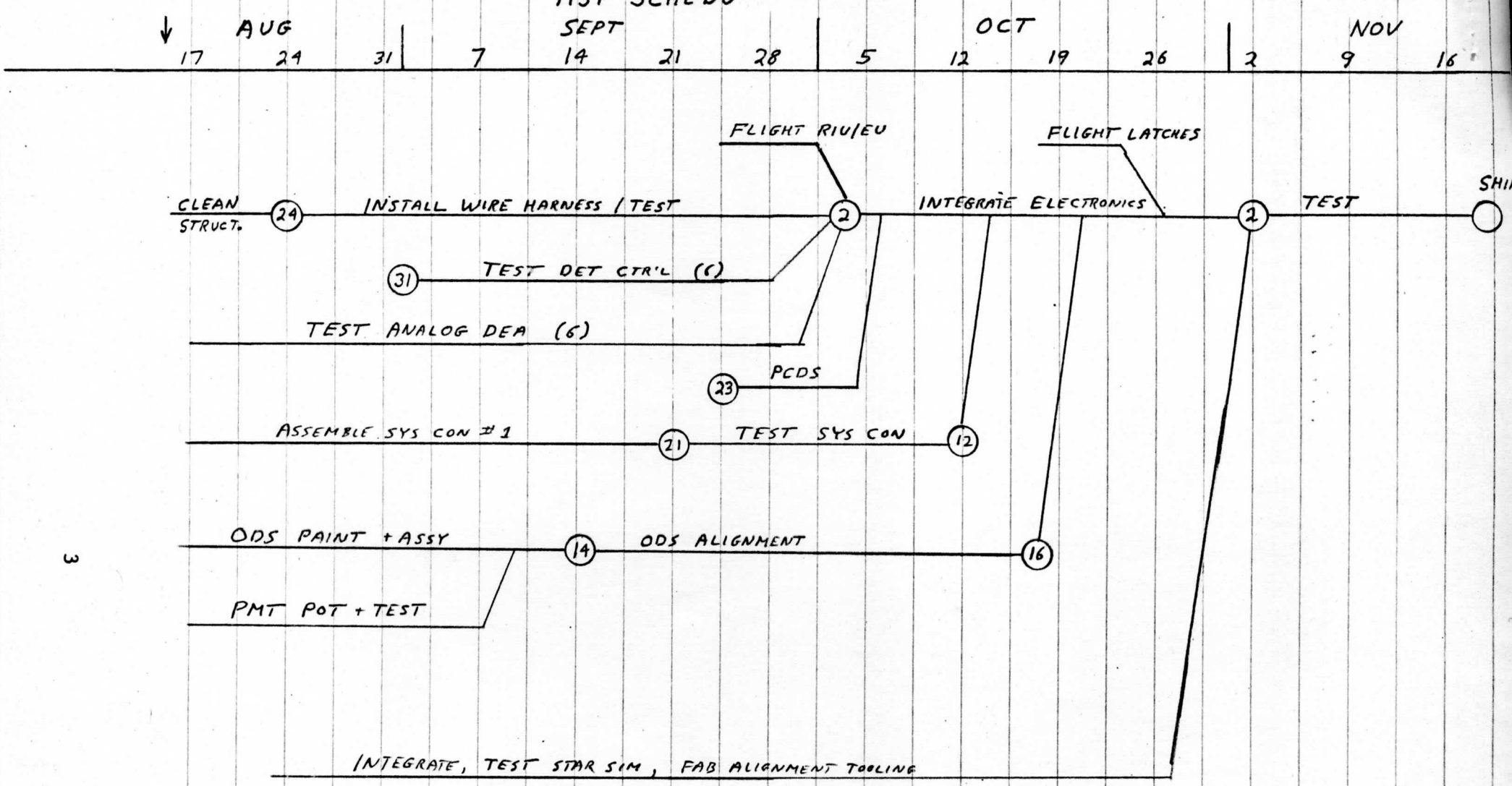
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F. CCB Activity

SI-OTA/SSM ICD PIRNs	ACTION
2140	Approved 8/28

SI-C&DH ICD PIRNs	ACTION
8121R1	Submitted by HSP 7/23
8126R2	Submitted by HSP 8/11
8127	Approved 8/10

HSP SCHEDU



EER
8-15-81

SS/ST Don Johnson
for file

DR-MA-02 Number 41
no longer includes SE-02
Issued: October 7, 1981

Monthly Report

for

September 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The PFU structure was cleaned and the wire harness installed in early September. GSFC (Chuck Vest) supplied several clean swabs to check the molecular cleanliness level of the HSP. The HSP structure was sampled in three areas chosen to represent different surface properties and widely separated areas. All samples had no detectable contaminants. Work on completion of the wire harness continues. Bulkhead heaters were installed and wired.

The ODS alignment has begun and will continue through the next month. Disassembly for painting has been deferred until the alignment is complete. The painting was rescheduled because all parts are pinned and require no alignment after disassembly and the painting process provides a good point to initiate contamination control.

All flight electronics assembly is complete except for the system controller conformal coating and installation into the box. System controller PWB subassembly and connector assembly was completed and the unit is now in preconformal coat test. Three of the six analog detector electronics assemblies have completed final acceptance tests and two more are nearly complete. The PAD threshold stability problems reported last month were caused by a loose coax connector in the test set up. Four of six detector controllers have completed acceptance tests. The remaining detector controller and the signal distribution unit will be completed in early October.

The quality problems in the PCDS have been corrected and both units have been reinspected, tested, and accepted. PCDS S/N 1 has been installed on the PFU.

The first HVPS that failed the long term threshold vacuum test has been repaired and successfully retested. The second unit has now been repaired and testing has begun.

ITT informed us in late September that the last IDT was complete and tested. The tube (a UV tube) was also unusually quiet having a dark count of less than one per minute. The S/N 4 tube which was returned for repair of the focus coil lead is also complete. Both units are expected in early October. The grounding modification scheme required to reduce noise has been worked out and parts have been received. The IDT rework is planned for October.

Flight software code was delivered to IBM in September, but difficulties with the tape necessitated sending a second tape. Test procedure writing for the C&DH simulator was slowed by DEC hardware problems. The tape drives were the subject of several service calls in September.

B. Schedule

The previously advertised November delivery to GSFC now appears to be unrealistic for the following reasons:

1. The ODS alignment has been rescheduled. A complete ODS will not be available to be installed into the PFU until late November. The ODS alignment task was previously underestimated and now appears to be the schedule pacing item.

2. The wire harness completion is taking longer than scheduled because of the inefficiency of working in a class 10k clean room.

3. Flight RIU's/EU were not delivered on October 1. The physical integration for wire harness completion was accomplished with engineering model RIU's. Once electrical integration begins, flight RIU/EU retrofit will add some time to the schedule.

4. Flight latch fittings are not expected by October 26 from PE. As of the end of September, no date had been established. Flight latch fittings are required prior to the start of PFU acceptance tests.

5. The latch fitting test at GSFC using the HSP TSU has not started as of the end of September. The GSFC test fixture and the OTA half of the latches are required for HSP PFU acceptance tests. (The fittings and fixture are required for all major tests except EMI).

While we are still working toward the earliest possible delivery, the latch fitting schedule may eventually prove to be pacing. Because of this, we intend to apply overtime with discretion. A December delivery is realistic if latches are received in time.

C. Problem Areas

No major problems exist at this time.

D. Science Section

Wayne Van Citters submitted information on HSP orbital verification to the project in September as requested by Dave Leckrone.

E. Documentation

No report.

F. CCB Activity

STR-02 PSCNs	ACTION
2009R1	Approved 9/11
2011	Approved 9/23

SI-OTA/SSM ICD PIRNs	ACTION
2131R3	Requested change in last sentence
2150	Approved 9/23
2152R1	Approved with proviso 9/11
2153R1	Comments provided 9/11

SI-C&DH ICD PIRNs	ACTION
8130R1	Approved 9/23
8131	Approved 9/21
8132	Approved 9/23

Appendix: HSP PTR log

****
* HSP PTR LOG *
* *
* VERSION 11 1Ø-Ø2-81 *
****

NOTE: TC = TELECON REFERENCE

HSP #	IBM #	DATE SUBMITTED	TITLE OR BRIEF DESCRIPTION	STATUS	ORIGINATOR
ØØ1	Ø6Ø?	1Ø-28-8Ø	DATA BASE UPDATE.	CLOSED	JCS
ØØ2	Ø61	1Ø-29-8Ø	VERSATEC DATA ERASURE.	CLOSED	JCS
ØØ3	Ø64?	12-Ø1-8Ø	DATA BASE UPDATE.	CLOSED	JCS
ØØ4	?	3-25-81	DATA BASE UPDATE.	CLOSED	JCS
ØØ5	?	3-27-81	DATA BASE UPDATE AND ADDITION OF EQUATION CONSTANTS.	CLOSED	JCS
ØØ6	---	5- 81	DATA BASE UPDATE (NO PTR, AS SUCH, WAS FILED.)	CLOSED	JCS
ØØ7	Ø94	4-23-81	SSIU FAILURE.	CLOSED	JCS
ØØ8	---	5-Ø5-81	RIU-B DOES NOT RESPOND TO SOME DISCRETE COMMANDS.	CANCELED 5-12-81	RRE
ØØ9	Ø98	5-18-81	SIMULATOR HANGS WHEN SI IS POWERED OFF.	CLOSED	JWP
Ø1Ø	Ø99	5-18-81	ERRORS IN ONE PASS CARRY OVER TO OTHERS.	OPEN	JWP
Ø11	---	5-18-81	ORDER OF TIME-TAGGED MESSAGES.	NO PTR ASSIGNED PER GSFC.	JWP
Ø12	---	5-21-81	BCU DOES NOT FUNCTION PROPERLY.	NOT A PTR MATTER-GSFC.	JWP
Ø13	1Ø1	6-Ø1-81	DATA BASE UPDATE TO ALTER TELEMETRY ITEMS.	CLOSED	JCS
Ø14	1Ø5	6-24-81	PAGE FORMATTER LOCKS UP DURING PAGE DEFINITION.	CLOSED	JWP TC 1Ø36
Ø15	---	6-25-81	CANNOT SIMULATE WITH BUSSES A/A/A NON-FUNCTIONAL.	CANCELED 6-26-81	JCS
Ø16	---	6-3Ø-81	INCONSISTENT BEHAVIOR OF EQUATION CONSTANT ARRAY ACCESS..	DISAPPROVED BY GSFC.	JML TC 1Ø25
Ø17	---	7-Ø1-81	SYNTAX FOR CONDITIONAL WAIT.	DISAPPROVED BY GSFC.	JCS TC 1Ø25
Ø18	1Ø7	7-Ø2-81	SUBSCRIPTED EQUATION CONSTANTS NOT USABLE IN DISPLAY PAGES.	CLOSED	JML

Ø19	11Ø	7-Ø3-81	STOL STATEMENTS YIELD VARYING RESULTS WHEN ISSUED FROM PROC OR TERMINAL.	OPEN	JML TC 1Ø36
Ø2Ø	1Ø8	7-Ø3-81	DATA BASE UPDATE.	CLOSED	JML
Ø21	112	7-13-81	DATA BASE UPDATE.	CLOSED	JCS
Ø22	115	8-Ø4-81	DATA BASE UPDATE.	CLOSED	JML
Ø23	118	8-28-81	FOUR-BYTE TELEMETRY VALUES ARE MODIFIED.	OPEN	JCS
Ø24	119	9-Ø9-81	DATA BASE UPDATE.	CLOSED	JCS
Ø25	?	9-15-81	TASK IMAGE-SIZE INSUFFICIENT.	OPEN	JML
Ø26	121	9-18-81	DATA BASE UPDATE.	CLOSED	JML
Ø27	?	9-29-81	DATA BASE UPDATE.	OPEN	JML
Ø28	?	1Ø-Ø2-81	CRITICAL COMMAND CHECK ENABLE/DISABLE.	OPEN	JCS

D Johnson
S. S / S. T.

DR-MA-02 Number 42
no longer includes SE-02
Issued: November 5, 1981

Monthly Report

for

October 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Work on the PFU wire harness continued in October. At the end of the month only the optical detector subsystem connector panel wiring and some thermistor wiring was not complete. The wire harness should be completed in November. Electronics integration will begin as soon as the wire harness is complete.

All electronics are complete, tested, and ready to integrate with the following exceptions:

System Controller -- Numerous minor problems found during preconformal coat testing have delayed completion. Several errors were discovered in the assembly drawing (diode backwards, wrong part number, wires reversed) and there have also been some design problems found (isolation resistor and bypass capacitor valves). All problems have so far been minor and easily corrected, but have delayed progress longer than anticipated. The System Controller is now expected to be complete by mid November. The remaining work is to conformal coat, install in the box, and perform final acceptance testing, which includes thermal and vibration.

Signal Distribution Unit -- Post vibration functional test remains to be done in early November.

Analog Detector Electronics Assemblies -- Post vibration functional tests are in progress and will be completed in early November.

High Voltage Power Supplies -- The high voltage output connector repair has been completed and tests performed on two units. Six units have completed vibration testing. Repair and retest will continue in November. One unit failed after repair because the repair was not correct -- the connector was not replaced. Another unit failed at the end of the month and the failure is now being investigated.

All tubes have now been received from ITT and all testing is complete except for the long term vacuum tests of the last two received (S/N 7, the last UV tube, and S/N 3, the repaired focus coil unit).

Vibration tests have been completed on the filter/aperture assembly, preamps, detector electronics assemblies, and the signal distribution unit. Two vibration tests were also conducted on the engineering model mirror mount. During the last axis of the first test the mirror moved in the clamp. For the next test the mirror was epoxied to the clamp and it did not move. The clamp to mount interface did shift the equivalent of 500 microns at the IDT cathode. The arrangement of the pins holding the clamp is now being changed and another vibration test will be run in early November. It should be noted that the vibration tests are being conducted at General Electric in Waukesha, Wisconsin without charge. We are indebted to the GE personnel for their generous support.

The ODS alignment is progressing without major problems, but because of the mirror mount vibration tests the rate of progress is slower than

we had planned. The ODS alignment work will continue through November into December.

Completion of the Star Simulator is becoming an item of concern because numerous design deficiencies have recently come to light in the process of integrating the electronics with the mechanical subsystem. Considerable redesign has been required to make subsystems that were previously believed to be complete function properly. While this is not yet a pacing item, it could become critical if further problems are encountered.

Software is progressing on schedule. The second tape of flight code was successfully received at IBM and comments are being received.

B. Schedule

Because there is no projected delivery date of flight latch fittings at this time, there is no projected delivery date of the HSP to GSFC for acceptance testing. Electronics integration should be complete in December and functional testing in January. Without flight latches, however, acceptance testing can only proceed through bench tests (R+I) and EMI. Flight fittings are required for modal, acoustic, and thermal vacuum tests.

C. Problem Areas

There are no major HSP problems at this time, but we are closely monitoring progress in several key areas that have the potential for becoming problem areas:

1. The HVPS repair and retest
2. The Star Simulator integration and checkout
3. The alignment of the ODS

D. Science Section

No report.

E. Documentation

No report.

F. CCB Activity

SI-C&DH ICD PIRNs	ACTION
8129R1	Approved 10/5
8133	Approved 10/7
8137	Submitted by HSP 10/23

55/57 Don Johnson 8 file

DR-MA-02 Number 43
no longer includes SE-02
Issued: January 15, 1982

Monthly Report

for

November/December 1981

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

NOTE: Due to the heavy schedule of meetings from November 30 to December 18 and the holidays, the November monthly report was delayed and combined with the December report.

A. Technical Section

The PFU wire harness was completed in November. Electrical integration began in late November and was completed by mid December. The first flight unit system controller was completed and tested in late November. All other electronic subsystem tests that were reported as incomplete in the last report have now been completed.

Six of the eight flight unit High Voltage Power Supplies have successfully completed long term vacuum and thermal cycling tests (5 units are required for flight). Two units have failed for reasons unrelated to the connector potting adhesion problem. One had a cracked high voltage capacitor and another has an apparent poor connection to the output connector. The two failed units will be repaired and tested. A continuing long term HVPS test program is planned to ensure that the problems have been correctly identified and that there are no other latent failure mechanisms.

Two problems with the Power Conversion and Distribution Subsystem (PCDS) were discovered during electrical integration of the HSP PFU. The first problem, failure of the ±15V supplies to start with a balanced load (eg. the focus coil of the IDT), is caused by too low a short circuit current in the current limit circuitry of the detector supplies. The corrective action required is to change the resistors controlling the short circuit current. This has been verified on a prototype module. The flight units will be repaired in January. The second problem was out of specification performance of the detector supplies due to light loading of the +5V supply. The problem will be corrected by adding a load resistor to the detector controller +5V input to bring the load up to PCDS minimum specification. The additional load is about 1.5 watts per detector controller (300 ma at 5V).

IDT tests are complete except for long term vacuum tests on the tubes, delayed by chamber problems and now expected to be completed in January. Flight PMT assembly and testing is complete.

The mirror mounting problems reported previously have now been corrected. The arrangement of pins was changed to provide improved stability.

ODS alignment is progressing without major problems, but behind schedule. We now hope to complete ODS alignment in January.

The Star Simulator problems continue to delay its completion. The major problem has been the linear encoders, which were twice returned to the manufacturer for alignment and repair. If no additional problems arise, completion should occur in January.

Flight software is progressing on schedule with a delivery to IBM expected in early January. The ground test SRD has been delayed to late January. Ground data management and analysis software milestones are now being rescheduled.

B. Schedule

Direction was received from GSFC in November to assume delivery of flight latch fittings on March 1, 1982. Based on that assumption, HSP delivery to GSFC for acceptance testing could occur by mid March if OTA side latches and fixtures are available.

A SOGS TIM is scheduled at Wisconsin on February 18, 1982.

C. Problem Areas

The major items of concern are:

1. PE latch delivery
2. ODS alignment schedule
3. Star simulator completion

D. Science Section

The next HSP team meeting will be at Wisconsin beginning at 1:00p.m. on February 16 and concluding about 3:00p.m. on February 17.

E. Documentation

No report.

F. CCB Activity

STR-02 PSCNs	Action
2007	Approved 12/14

SI-OTA/SSM ICD PIRNs	Action
2149	Approved 11/2
2155	Approved 11/2
2156	Approved 11/2
2158	Disapproved 11/2 (subsequently approved 1/5/82)
2159	Disapproved 11/2
2162R1	Approved 12/22
2165	Disapproved 12/3

SI-SI C&DH ICD PIRNs	Action
8134R1	Received
8140	Approved 11/17
8141-45	Received
8147	Received

Don Johnson SSS

file

DR-MA-02 Number 45
Issued: April 12, 1982

Monthly Report

for

February/March 1982

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

Major problems were encountered in February which have delayed completion of the PFU and have been the subject of most of our attention during the period.

During the power-on portion of the ODS integration procedure in February, a serious detector noise problem was discovered. This test was the first time a flight IDT was operated with the flight instrument. Previous tests with the engineering model IDT did not have the problem Investigation centered on differences between the engineering and flight IDT's. We found that a "design improvement" was incorporated by the IDT supplier into the flight units that was not considered significant and was therefore not reported at the time. The change was a small PWB to which the anode lead and shield were connected instead of directly to the tube pins as was the case in the engineering model. This arrangement left a greater length of anode wire unshielded and resulted in unacceptable noise pickup. A repair procedure was devised to restore the original engineering model configuration. The procedure involves depotting the anode lead, cutting the lead from the PWB, reconnecting directly to the tube pin, and repotting. The shields of all focus and deflection leads are also grounded to the IDT housing inside the cable clamp. This repair has now been completed and tested successfully on four of the six flight detectors. The noise performance has been improved to the point that the system noise is determined by the preamp. All of the repaired tubes have been tested in vacuum, one has accumulated 240 hours. A related problem was found on the PMT and is being corrected.

After installing the change to the flight mirror several small cracks were discovered in the glass near the clamp. The cracks are nowhere near the optical surface and may not be significant. After considerable study, testing, and consultation with optical and glass experts, a modification of the mirror clamp assembly procedure was proposed. The modified assembly will have an RTV gasket potted in place between the clamp and the glass. New mirrors have been procured and the modified assembly will be tested and if successful installed in the flight unit if the schedule allows prior to acceptance testing. If not, the installation will occur during or after acceptance tests. The mirror rework is therefore not a schedule pacing item because the cracked mirrors can be used until the changeout is completed.

The most serious problems were found in the PCDS (Power Conversion and Distribution Unit). The previously reported rework to correct the short circuit current test select resistor was completed on both units. Because of the rework it was determined that the temperature and vibration tests should be repeated. The PCDS test set was obtained from Rockwell in order to perform temperature tests at Wisconsin. The vibration test was run first at GE in Waukesha and the first unit developed a rattle during vibration. Subsequent investigation determined the cause was a tantalum capacitor which was not properly staked and had broken from its leads. The epoxy had not bonded the part to the chasis because a wire was under one end of the capacitor preventing contact with the chassis. Rockwell supplied a replacement part which we installed but declined to provide a revibration test. After the capacitor was replaced, a temperature test was attempted. It was then that a number of out of specification conditions were noted:

	FAILURE	SUPPLY	UNIT	TEMP
1.	Output voltage below specification at maximum load and minimum input voltage	Prereg A,B Digital B	S/N 1	+25°C
2.	Overcurrent shutdown occurs when input power applied at maximum load	Prereg A	S/N 1	+25°C
3.	Output voltage below specification at maximum load and minimum input voltage	Prereg A,B	S/N 2	+25°C
4.	Output voltage below specification at maximum load and minimum input voltage	ALL	S/N 1	-40°C
5.	±15V outputs below specification with maximum load on ±15V, minimum load on +5V, maximum input base voltage	Det 1 (possibly others)	S/N 1	-40°C
6.	Output voltage below specification at maximum load and minimum input voltage	Digital A,B Det 1,1,2,5	S/N 2	-40°C

These failures were not marginal but would result in loss in instrument function considering realistic loads and environments. A question that naturally arises is how did the units pass the temperature test at Rockwell prior to delivery? Examination of the Rockwell test set and the temperature test data provides at least part of the answer. Some of the loads in the Rockwell test box did not provide the specified loads:

SUPPLY	TEST BOX LOAD	SPECIFIED LOAD
PREREG	560 MA MAX	750 MA
PREREG	176 MA MIN	50 MA
DIGITAL +5V	4.4 A MAX	5.6 A
DIGITAL +5V	1.42 A MAX	1.56 A

The -40°C tests were performed with the chamber air controlled to -40°C after several hours of PCDS operation during which the PCDS box temperature rises to approximately -15°C. The PCDS specification requires operation within limits after five seconds of power application. For example, S/N 2 "-40°C" test of 7/7/81 with 24V input, full load, output failed initially, was retested after three hour warmup and passed. This is not allowed by our specification.

The test data has many cases indicating minimum loads were actually selected instead of maximum loads during maximum load tests. The data sheets show the output voltages for minumum and maximum load current identical within a millivolt. For example: S/N 2, 7/9/81, sheets 16-18

LOAD	SYSCON A +5V OUTPUT VOLTAGE
MIN	5.035V
FULL	5.001V
MAX	5.035V

The min and full load data can be repeated but our results do not confirm the maximum load data. It therefore strongly suggests that maximum loads were not actually applied during the original tests.

We have discussed the failures and related findings with Rockwell and there is technical agreement. Because of their reluctance to acknowledge responsibility and expend any resources, and our schedule, we have proceeded to analyze and correct the problems with Rockwell support limited or occasional technical telephone consultation and a few parts. Rockwell management has taken the position that these problems do not fall under their warranty obligation in spite of what we believe is clear language to the contrary in the contract. While this attitude is surprising in view of Rockwell's position in the industry and performance on previous subcontracts to Wisconsin, we do not consider it a significant handicap at this time considering their performance and quality on this contract to date, which has been unacceptably poor.

The redesign required to bring performance of the PCDS within specification involves changing some base resistors to increase drive current, small changes in transformers to accomodate the specified maximum load, and some modification to output filters to correct excessive ripple. The repairs to date have been straightforward and can easily be done in-house. The workmanship quality is better, schedule impact is less, and testing more carefully done in house than would be the case had Rockwell determined and implemented the repairs. At this time, the pre-regulator operates satisfactorily, and the repairs to the digital and detector supplies are still being tested.

The ODS alignment work is progressing but at a much slower rate than was expected. The mirror problems contributed to the delay but it is mostly due to numerous small problems and over-optimistic schedule projections. We now expect the alignment activities to be completed in April.

The SI half of the C latch was received and appears to be in satisfactory condtion. No fit check has been attempted.

B. Schedule

We are presently working toward delivery of the PFU to GSFC for acceptance tests in May. While this is possible, there are several possible difficulties that could cause delay:

1. PCDS problmes now appear to be nearly resolved. If additional problems arise schedule impact may be mitigated by using both units to keep system tests and PCDS repair activities going in parallel.

2. Further alignment schedule slip is directly in series with start of system tests.

3. A decision to incorporate the revised mirror mounting in the PFU before acceptance test could result in a small (1-2 week) delay.

4. Latch delivery/installation is not firm at this time.

5. OTA side latches may be required for MSFC/PE latch qualification tests. Use of alternate latches for TV tests at GSFC could cause delay because the TV fixtures would require rework.

C. Problem Areas

The major technical problems are discussed in section A of this report. All current technical problems are presently being resolved and are not expected to cause additional schedule slip.

Several new areas of concern have arisen recently with respect to VAP and LMSC test planning. Our present concerns which have been discussed with the GSFC STSOP are as follows:

1. We have been advised that the science data quick look file will not be available for single instrument integration on the VAPCS. The consequences of this are greatly increased time to run tests at VAP or substantially reduced level of testing, lack of portability of software between our SI CDH system simulator and VAP and therefore incomplete test software verification prior to VAP, and cost and schedule impact on VAP test software.

2. We are concerned that planning for ST level tests at LMSC is beginning from an ill-advised premise that says SATS procedures will be derived from VAP/STOL procedures. The consequences of this could severely limit the testing both at VAP and LMSC.

3. We are also concerned that the communication between the associate contractors is too constrained to facilitate timely exchange of information. The presently defined role of the SI contractors in providing information to LMSC is severly limited.

These areas need further discussion to avoid a serious impact on system level testing.

D. Science Section

A team meeting and SOGS TIM was held in February. The next HSP team meeting is in May at MIT.

E. Documentation

DR-DM-04B preliminary was submitted in February.

F. CCB Activity

SI-OTA/SSM ICD PIRNS	Action
2168R1	Disapproved 3/30
2174	Disapproved 3/30
2144R1	Approved 4/7
2155R1	Approved 4/7
2166	Approved 4/7
2167	Approved 4/7
2170	Approved 4/7

SI-SI C&DH ICD PIRNS	Action
8153	Approved 3/26
8152	Approved 3/30
8154	Approved 3/30
8146R1	Approved 4/7

SS/Space Tele Don Johnson file

DR-MA-02 Number 46
Issued: June 2, 1982

Monthly Report

for

April/May 1982

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

A. Technical Section

The ODS alignment is now complete except for the PMT which could not be aligned because the dichroic was not complete. The dichroic splits the light between the PMT and one IDT permitting simultaneous observation in both detectors. The PMT alignment will be performed after system functional tests and prior to acceptance tests at GSFC.

The ODS was re-assembled and integrated. During the last week of May the ODS was installed and electrically integrated with the PFU. The integration test anomalies and resolution plans are as follows:

1. Detector 4 no continuity between redundant -10v supply input wires between DE4-J4 pins 5 and 8. Unit functions acceptably and will be repaired at a convenient time during or after functional tests.

2. Detector 5 (PMT) noise count rate high. Presently investigating - no corrective action identified.

3. Test lamp on structure not yet installed,will be tested after completion.

4. Thermistors TPODSA-B and TPDET4-B open. Appears to be a missing wire which will be repaired when the ODS is removed for PMT alignment. Wire is inaccessible with ODS installed in PFU.

5. Detector 4 high voltage analog monitor slightly (5 counts low) out of limits. Corrective action not determined - may use as is.

At the end of the month the integration of the flight unit was complete and preparations were being made to begin system functional tests on June 1.

The modified mirror clamp assembly has been tested in vibration and numerous temperature cycles and appears to be completely satisfactory. New mirror blanks have been received and were aluminized. The reflectivity at 1216 A was low - about 60% - for reasons that were not immediately apparent. The mirrors were recoated at GSFC and now have 84% reflectivity at 1216 and 80% at 1608. The present plan is to install and align the new mirrors prior to the start of acceptance tests. This will most likely be done at the same time as the PMT alignment.

The PCDS problems are still not resolved. While testing the correction described in the last report (transformer changes, filter modification) some new problems were discovered. A switching spike voltage was discovered on Q2 of the digital supply that exceeded the breakdown voltage rating (90V)of the transistor. The spike has been reduced somewhat by using bifilar windings in the transformer but it is still approximately 100 volts worst case at -40°C. The spare transistors were tested and some have breakdown voltages over 120 volts. Since we have not been successful in finding a satisfactory transistor with a higher rated breakdown voltage (because the switching speed tends to be slower) we are installing some transistors with the tested higher breakdown voltage. The spike will exceed

the rating of the transistor but will be less than the actual breakdown voltage.

After the new transformers were installed in the preregulators one preregulator module was found to have an instability (a low frequency oscillation) at light load. The loop has a marginal gain/phase shift condition and the slight increase in loop gain provided by the transformer induced the instability. This condition is easily corrected by changing two resistors and two capacitors and will be implemented in all preregulator modules. The stability of the loop is marginal even after the correction, however.

The most recent problem discovered is an overstress condition in the pre-regulator at low input bus voltage. We are required to survive any input voltage between 0 and 35 volts without damage but the preregulator has a problem between about 18 and 20 volts input. In that range the series regulator (a 723,U9) dissipates about 1.5 watts or 3.5 times its rated value. It is also subjected to about a 40% overstress during each turn-on transient. The fix for this problem has not been determined.

There were some discussions of the PCDS problems (prior to the discovery of the recent problems described above) with Rockwell management. They do not accept responsibility for any problems at low temperature because of how they interpret the contractual requirements. They do not believe there were any room temperature performance problems when the units were delivered but they offered to retest to verify these problems if the units were returned to Cedar Rapids, and to correct problems if they exist. They would not agree to verification of the problems at Wisconsin and would also not agree to correct temperature related problems without additional funding. In view of our schedule, test logistics, and Rockwell's limited offer, we elected to continue to pursue the fixes at Wisconsin. Rockwell did agree to provide parts, telephone consultation, correct schematics, and a vibration test.

Our current plan is to incorporate all presently known fixes into S/N2, perform a temperature test, vibration test, and final functional test. If successful, the unit would then be suitable to support HSP PFU acceptance testing except that input voltage between 15 and 21 volts on the power bus should be avoided. S/N 1 will be repaired in July and could incorporate a fix to the low input voltage problem if the solution is found in time. It should be noted that our confidence in the PCDS at this time is not high, based on our recently acquired knowledge of many important design details. Performance margins of the unit are extremely small in many areas and our review has not extended to the entire design but has been concentrated in those areas in which problems have occurred.

All three flight latches have been received. An inspection and installation will be performed in June.

B. Schedule

The current official ship date to GSFC is June 15. It is likely that shipment will occur later in June, perhaps early July. The factors influencing schedule are as follows:

1. The transportation company requires two week advance notice of the ship date. (A GSFC GBL has been prepared and all arrangements have been made except to set a date).

2. Functional tests (short form, long form) are scheduled to begin June 1 and will require about two weeks to complete if there are no major problems.

3. After functional tests are complete, there is about two more weeks of work, including:

a) repair/rework of items noted in integration test
b) substitute PCDS S/N 2 for S/N 1
c) Remove +5v load resistor from detector controller
d) align PMT, install, pin dichroic
e) install snout on polarimetry tube
f) install filter/aperture tubes
g) drill forward bulkhead for star simulator closeout baffle
h) drill out preamp fiber washers (allow tolerance for mounting bolts)
i) move HV connector on upper IDT bracket (allow greater level radius)
j) install/align flight mirrors
k) repair thermistor connection TR4 to TR10
l) install test lamp

4. If a pre-ship environmental readiness review is required, it also should be included in the schedule.

5. Latch fitting installation is scheduled for June 8. If there are no major problems there should be no further schedule impacts due to latches.

C. Problems

The major problem is the performance of the PCDS.

D. Science Section

A team meeting was held at MIT in May to discuss observation plans. The next team meeting is scheduled for September 27, 28 at Wisconsin.

E. Documentation

No report.

F. CCB Activity

SI-OTA/SSM ICD PIRNS	Action
2144R3	Approved 5/4
2175	Approved 5/4
2179	Approved 4/29

SI-C&DH ICD PIRNS	Action
8156	Approved 4/28

8159R1	Approved 4/28
8160	Approved 5/4

SMO-1000 PSCNS	Action
MK021R1	In Review
MK022	Approved 4/29
MK023	In Review
MK024	In Review

Don Johnson

DR-MA-02 Number 47
Issued: August 11, 1982

Monthly Report

for

June/July 1982

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

A. Technical Section

In early June direction was received from the GSFC project office to establish and maintain a firm date for delivery of the HSP flight unit to GSFC for acceptance tests. July 7 was the date established for shipment. It was agreed that some work which was originally intended to be completed prior to shipment would be deferred. It was also agreed that the minimum test baseline for acceptance tests would be the short form tests, and long form tests would only be performed to the extent that time allowed prior to July 7.

System functional tests began in early June and continued through June 30. There were no failures or anomalies in the HSP, but there were numerous GSE test software problems that required considerable time and effort to overcome. One primary test objective, to test the HSP with the SI C&DH simulator, was not accomplished because the simulator had several hardware and software bugs. We had hoped to test the HSP with the simulator because it can collect science data at a much faster rate (although not quite at the maximum one megabit rate) than our GSE. While attempting to debug a test procedure on the simulator with the engineering model, several problems came to light. The science data interface to the SSIU has anomalous voltage and currents on a line connected to a line receiver. This may be the cause of a failure of a line driver in the HSP engineering model. There is also no signal ground connection in the SSIU signal interface. Because of these hardware anomalies the HSP flight unit was never connected to the simulator. There were also several software bugs which have been the subject of PTR's which have been closed but have not yet been included in the fix tape sent to us. For example, we still cannot verify four byte telemetry values because the software fix hasn't been sent but the PTR has long been closed (Perhaps PTR's should not be closed until the fix has been received by the user and verified).

PCDS S/N 2 failed temperature tests in June but it was determined that it would most likely function satisfactorily during acceptance tests at nominal (28v) input bus voltage. It will not likely function at bus voltage extremes (24 and 32v). We elected to postpone vibration tests on S/N 2 and install it as is into the flight HSP. The major effort was then applied to S/N 1 in an attempt to correct the remaining problems. By the end of the reporting period several new problems were discovered which make the prospect of successful repair to a flightworthy condition unlikely. Effort has begun on a new design.

Final inspection of the HSP flight unit was done by ONR in late June. ONR submitted a report to GSFC which noted the PCDS S/N 2 was not flightworthy and the C latch had sharp edges in violation of the ICD.

A VAP test requirements review was held at GSFC on July 8, and a short follow-up session on July 15. We were instructed to delete all fortran utilities from our VAP test procs except the one needed to drive the HSP star simulator from the VAPCS. This means all existing VAP test software must be re-written and the time required to test VAP software on the simulator and engineering model will increase. Work has begun on re-writing VAP test software to comply with the new guidelines.

The HSP flight unit arrived at GSFC on July 9. No damage was found during inspection of the instrument and GSE. Incoming baseline electrical tests were completed the following week. Mass properties measurements were complete in late July. The HSP expected flight weight is 570.97 lbs, all but 1.1 lbs of which is actual measured weight. The 1.1 lbs includes hardware that is not yet installed - primarily PMT optics and IDT #1 filter/aperture assembly hardware. The 29 lb underweight condition is due to previously hidden contingency carried in structure weight and unneeded required contingency. The hidden contingency was held for wire harness and electronics growth but was not needed.

B. Schedule

The present schedule shows modal survey, ORM, and acoustic test in August followed by EMI/EMC and ODS removal in September. The ODS will be returned to Wisconsin for PMT completion/alignment and installation/alignment of the flight mirrors. This will be done during bakeout of the rest of the HSP at GSFC. Schedule for the new PCDS is being worked out but a new unit is required prior to shipment of the HSP to LMSC in October 1983.

C. Problems

The major problem is still the PCDS. Other problems include:

1. Sharp edges on the C latch
2. No signal ground between the HSP the C & DH simulator.

D. Science Section

No report.

E. Documentation

No report.

F. CCB Activity

SI-C&DH ICD PIRNS	Action
8140R1	Approved 6/16
8158	Approved 7/22
8163	Approved 7/26
8165	Approved 7/26

Axial SI-OTA/SSM ICD PIRNS	Action
2153R2	In Review
2156R1	Approved 7/29
2177	Approved 6/16
2180	Approved 7/23
2182	Approved 6/16
2183	Approved 7/29
2185	Approved 7/26
2186	Approved 7/26
2188	Not Approved 7/26
2189	Not Approved 7/26
2190	Approved 7/26

Radial SI-OTA/SSM ICD PIRNS	
3146	Not Approved 7/26
3147	Approved 7/26
3149	Not Approved 7/26
3150	Not Approved 7/26
3151	Approved 7/26

SMO-1000 PSCNS	
MK2024	Approved 6/18

STR-02C PSCNS	
2021	Approved 7/29

G. HRS MGSE

At BASD request the sling was redesigned to reduce stress on the lifting hooks. End plates have been manufactured and are now being anodized. The dolly is expected to be assembled in mid-August. Delivery of the dolly, sling, and end plates is expected to be complete by September 1. The shipping container delivery is expected by November 1.

SS/Space Tele
Don Johnson
fw

DR-MA-02 Number 48
Issued: September 16, 1982

Monthly Report

for

August 1982

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
UW Account No.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

A. Technical Section

PFU acceptance tests continued at GSFC in August. Optical reference measurements (ORM), modal survey, acoustic, and post-acoustic ORM and functional tests were completed. The only anomaly noted to date is a lack of response to light from the PMT. Dark count is normal. One possibility is that a cover was left on when the ODS was installed. The anomaly will be investigated when the ODS is removed for its scheduled return to Wisconsin in mid-September for completion of the items defined in June. Preparations are being made for EMI tests which are scheduled for early September. After EMI the ODS is removed and thermal vacuum preparations begin.

The flight spare PMT assembly failed in temperature test after about 100 minutes at -40°C. The failure symptoms are consistent with a broken tube glass envelope or an open connection. The PMT assembly was taken to GSFC to be x-rayed but the photographs do not show any obvious cause of the failure. The PMT assembly will be disassembled and analyzed in September. There are two spare PMT's (bare tubes) which have been successfully temperature tested recently and are ready to be assembled. Additional tubes have been ordered.

Temperature tests of modified/repaired PCDS S/N1 modules in early August indicated some of the design problems had been corrected but several additional problems remain to be corrected. The amount of repair required to implement the corrections necessary would seriously further reduce the quality level which is already unacceptably low. We have concluded, as has the GSFC project office and all of the various review teams that have investigated the PCDS design and workmanship, that the Rockwell PCDS is unfit for flight and must be replaced. Rockwell has been officially notified of this fact. Rockwell has not been especially helpful in resolving the PCDS problems in that they did not recognize their warranty obligations nor did they fulfill agreements made in early May. The May agreements were an attempt to obtain some support from Rockwell in lieu of full warranty coverage which they were unwilling to provide. Rockwell did not accept our offer to brief management in Cedar Rapids on the full extent and history of the PCDS problems which we felt might have altered their position because many of the problems were evident in the acceptance test data and others were hidden by "errors" in the test procedure and test hardware. These "errors" resulted in less than specified loads being applied to the PCDS in test. If the test procedure had been run correctly, the units would have never been shipped from Rockwell. Because Rockwell management has so far taken little interest in these matters, we do not expect any further support from them.

The new redesigned PCDS is now receiving our full attention because work to correct the Rockwell box has been stopped. A breadboard is being built, package design has begun, and parts are being ordered. A preliminary schedule has been reviewed with the GSFC project office and GSFC is assisting in various ways, primarily in parts and design consultation.

The SSIU was repaired (line receiver failed) and the signal ground wire was added in June. A problem in running multiple observations was found to be caused by a software deficiency in the application processor

initialization routine. Once this was corrected, the HSP/C&DH interface was tested successfully. Effort now continues to close the loop with the target acquisition application processor using the star simulator. While the individual elements seem to work properly, the entire system has not been successfully demonstrated.

Coding of the VAP test software was begun in August and some procedures will be tested on the engineering model in September.

B. Schedule

The EMI test and ODS removal will occur in September. If ODS rework/completion proceeds smoothly, thermal-vacuum will begin in November and be completed prior to mid-December.

C. Problems

The major problem is the PCDS. The PMT anomalies are another item of concern.

D. Science Section

The next HSP team meeting will be held in Madison on October 4-5. Observation programs will be the major topic.

E. Documentation

The following major document was delivered in August:

DM-05 D Flight Software User/Operator Manual--July 1982
HSP/GSE Software User's Guide--August 18, 1982
ST/HSP Acceptance Electrical Test Plan/Procedure--August 18, 1982

F. CCB Activity

SI-C&DH ICD PIRNS	Action
8164	In Review

SMO-1000 PSCNS	Action
MK027	Approved 8/11
MK028	In Review

SAV-100 PSCNS	Action
1001	Concur 8/30

OTA/SSM FSEC Deviation	Action
919-W-25 - RIU failed	In Review

G. HRS MGSE

The HRS dolly, sling, and endplates were completed in August. We were requested by GSFC/BASD to postpone delivery because the HRS need date has changed significantly. Cost savings are possible if the HRS shipping container can be completed in time to make one delivery of all hardware to BASD. There were some minor design changes requested by GSFC/BASD which were incorporated without schedule impact.

H. TSU (Latch test at MSFC)

The TSU C fitting interface plate was returned twice in August for repair of the latch fitting mounting holes which were not within the perpendicularity specified in the ICD. We have also provided information and documentation to support the preparation for the latch test at MSFC.

53/57
P. Johnson
1539

DR-MA-02 Numbers 50-53
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Monthly Report

for

October 1982 - January 1983

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS 5-24487
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Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

A. Technical Section

The ODS reassembly and alignment was completed in early November. The ODS was returned to GSFC, installed in the HSP PFU, and tested. The PFU was installed into the thermal vacuum test fixture and put into the GSFC 12' x 15' chamber and tested just before the Thanksgiving holiday. The TV/TB test began on November 29 with chamber pump down. The pressure inside the HSP was 1.3×10^{-5} torr after 24 hours and 4.0×10^{-7} after 48 hours. The particle filters were left off the vents for the test and will not be used in flight. Temperatures during the test were close to model predictions. The greatest differences were in the detectors which ran slightly warmer than predicted and the bulkheads which were slightly colder. Most predictions were confirmed to within one degree (C). The test confirmed that the HSP can meet ICD thermal and power requirements, control detector temperatures as planned, and generally operate within the intended envelope. Because there was an f24 light source for IDT #3 the mechanical response of the detector as a function of temperature could be observed. The movement of the apertures on the IDT cathode was recorded for various operating modes, temperatures, and transistions. There were four malfunctions noted in the test:

1. The temperature monitor (thermistor) on IDT #4 connected to RIU B failed during an early hot to cold transition (GSFC Malfunction Report F04006). The failure was caused by a broken wire in the HSP harness at the RIU connector. The connection was repaired in early January and retested. That connector had been reworked previously because of design changes and had therefore been subjected to greater than normal handling. All wires on that and adjacent connectors were re-inspected. No additional damaged wires were found. The malfunction report was closed on January 13.

2. System controller A loses engineering telemetry sync when a serial command having bit four (16) set is received when the system controller temperature is +35°C or higher (GSFC Malfunction Report F04007). This problem is believed to be caused by a CMOS IC (4076) with low current sinking capability at high temperature. This would not be expected to be a major problem in flight because the engineering telemetry is resynchronized upon receipt of the next major frame pulse. The only loss would be a portion of the major frame engineering telemetry. The screening data on these parts (screening lot FS00085B) contain no indication that they were (unlike all other IC's) tested at high temperature. It is therefore possible that this condition has always existed in the unit and has simply escaped notice. We plan to remove the system controller from the HSP PFU in early February, return it to Madison, confirm the cause of failure, and repair by replacing the IC with one tested at high temperature. The malfunction report remains open.

3. Preregulator A of the PCDS failed in high temperature (+35°C) late in the test. (GSFC malfuntion report F04008.) The failure was caused by a catastrophic failure of the voltage regulator IC. The chip is overstressed in its application and was one of the design changes

intended for the Rockwell PCDS before the effort to correct its problems was abandoned. The regulator IC was replaced in A and a series pass transistor was added to both A and B to prevent future failures of this type. The unit was retested and will be re-installed in early February. This PCDS will be replaced by the new design unit later this year and is therefore non-flight hardware. The malfunction report was closed on January 13.

4. High voltage power supply S/N 2 failed late in the test (during segment 41 of 43). (GSFC malfunction report F04009.) The output voltage dropped to zero but could be returned to its nominal value by cycling the HVPS input power. The symptoms were those of a temporary overload which tripped the foldback current limit. This condition was repeated in ambient on both the system and box level. The problem is therefore confirmed to be limited to the HVPS and does not involve the input power, control inputs, or load. The problem occurs after hours to days of operation at an output voltage of 2300 V or higher. Failure has so far not occurred at lower output voltage, 2200 V and below. We so far have insufficient information to isolate the cause of the failure. Unlike previous HVPS problems, this unit can be operated satisfactorily after cycling power. We are reluctant to perform exploratory surgery on the potted high voltage section until all other possibilities are exhausted because of the probability of destroying the evidence. HVPS S/N 7 was recently tested in a vacuum (10^{-7} TORR) for two weeks and will be installed in the HSP in early February. Testing will continue on S/N 2 and the malfunction report remains open.

The HSP PFU was removed from the chamber in early January. The TV/TB test instrumentation was removed. There has been recent concern expressed about the blue stripped wire specified for various ST applications being a source of contamination. The portion of the HSP wire harness having such wire was wrapped with kapton tape.

In February the PCDS will be reinstalled, the HVPS S/N 7 installed, and the sytem controller removed, repaired, and reinstalled. Calibration tests and a second acoustic test (to check the rebuilt ODS) will be performed before VAP begins in early March.

The ITE had coded all and tested all but one of the short form test procedures by the end of January. There has also been much progress recently in closing the HSP-NSSC-1-EGSE/star simulator loop to demonstarte HSP target acquisition. If progress continues there should be a "golden spike" demonstration in February.

Some confusion about the science data word byte order was recently discovered and resolved. Both the NSSC-1 code and the C&DH simulator Fortran have been revised to accomodate the correct word-byte order.

The new PCDS continued to progress without major problems. The digital supply breadboard tests have been completed and the detector supply tests are well along. The three major supply types are similar (digital, detector, and preregulator) so the same breadboard is being used for all three with appropriate modifications. All parts have been ordered and most have been received and are in screening. Printed wiring board layout and detailed mechanical design have begun.

The first installment of the HPS User's Guide is being prepared for February delivery. It will consist of an overall description of the HSP, based on the recent GSFC-STScI publication; a System Controller User's Guide (preliminary version), and the latest flight software User's Guide.

Work has started on the flight filter/aperture tube assemblies. The date of installation into the HSP has not been scheduled.

B. Schedule

VAP is now scheduled to begin with an HSP-RISS test on March 7. There are no known risks to that date. The replacement PCDS schedule is tight and ambitious, but is so far progressing well. The major schedule concern during the period was the TV/TB test at GSFC which was completed a few days early. It should be noted that this was the result of an excellent effort on the part of the GSFC and contractor personnel involved who provided first class support.

C. Problems

The PCDS replacement schedule is tight and requires continued attention but there are no major difficulties evident. A greater concern is the area of SI input into VAP and LMSC A&V test planning which has been the subject of recent discussion and correspondence.

D. Science Section

A team meeting was held October 4-5 in Madison.

E. Documentation

A preliminary HSP User's Guide is expected to be delivered in February.

F. CCB Activity

SI C&DH PIRNS	Received	Action
8175	12/17	Approved 1/4
8176	12/27	Approved 1/10
8177	12/16	Approved 1/12
8178	12/28	Approved 1/14
8179	1/7	Approved 1/24

G. HRS MGSE

The HRS stiff shipping frame (SSF) and shipping container were completed in January and will be tested in early February. After the tests are completed, the SSF will be painted. The entire HRS MGSE will then be ready for delivery when required.

H. TSU (Latch test at MSFC)

During a recent visit to MSFC several modifications to the HSP TSU were observed, none of which have been disucssed with HSP personnel. Significant biological contamination of apparent aviary origin was also evident. The TSU will obviously require a thorough cleaning before it can be brought into a contamination controlled facility.

D. Johnson 35/37

DR-MA-02 Number 54
Issued: March 3, 1983

Monthly Report

for

February 1983

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS 5-24487
UW Account NO.: 144-L324

Prepared by

Space Science and Engineering Center
University of Wisconsin-Madison

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

A. Technical Section

Printed wiring board (PWB) layout work continued in February on the Digital supply for the new PCDS. The digital supply has the highest parts count of the three supplies in the PCDS. It became evident as work progressed that there was insufficient board space for the required number of parts. The parts count has grown in the design and breadboard test process, but the most significant impact on board area was the space required to correct some EMI/EMC problems. In order to avoid using multilayer rather than double sided boards, it was decided that the box and therefore the boards could be made larger with modest effort. The box has been redesigned to provide the required PWB area while preserving the electrical and mechanical interface. The electrical design effort has been focused on solving the one known remaining problem; a low frequency input susceptibility. Several possible solutions were examined and rejected because of complexity, insufficient area, or other technical difficulties. As of the end of the month a relatively simple solution had been designed, analyzed, built into the breadboard, and was about to be tested. If successful, the layout of the digital supply PWB on the revised outline will proceed in March. The schedule of the PCDS was extensively revised to recognize the delays due to the design problems and the new mechanical box design. The new schedule also provides for a build and test of one set of qualification modules (which will become flight spares) before the building of the flight unit modules. Additional manpower has been assigned to the PCDS to accelerate the design and layout of the heater switching, monitor circuit, and EMI filter sections. The revised schedule shows completion of the new PCDS (ready for box acceptance test) on December 1.

The system controller problem (MR F04006) has received much attention during the month. The flight unit (S/N 1) was removed from the HSP and returned to Wisconsin early in the month. The failure symptoms were confirmed when first tried but subsequently disappeared for most of the rest of the month. Late in the month it was discovered that the presence or absence of the scope probe on the line in question determined whether or not the failure occurred. With the scope probe in place, the failure would not occur. (Heisenberg?) It was then obvious that the problem was due to the tristate output not being pulled down, which could be easily corrected by the addition of a large value resistor. The details of the corrective action were still being worked out at the end of the month. The beginning of VAP at GSFC may be slipped one week to allow the fix to be installed on the system controller.

The high voltage power supply problem (MR F04009) now appears to be the same problem that occurred earlier in the program: lack of adhesion of the potting to the high voltage output connector insulator. The corrective action for the earlier problem was to replace the connector, prime the connector, and repot. The original units were not primed. All units were tested and only the ones failing a long term thermal vacuum were repaired. S/N 2 (the unit that failed in HSP TV/TB) was not repaired. While testing S/N 2 recently, S/N 6 was also placed in the vacuum chamber for a long term test. S/N 6 was another unit that was

not repaired. S/N 6 began exhibiting symptoms similar to S/N 2 during the test and eventually both units degraded to the point that their symptoms matched those of the earlier connector problem. The failures became predictable and the blue arc was observed in the location of the high voltage connector. It therefore appears that this is the same problem as before and is occurring on the units that were not repaired. We plan to repair S/N 2 and S/N 6, test for an extended period (i.e. 60 days minimum) and then replace any unrepaired HVPS remining on the flight HSP.

One of the most significant milestones of the month was the closing of the target acquisition loop. The NSSC-1 application processor, initiated by a command load, commanded the HSP engineering model to perform the required area scan, transferred the science data to the NSSC-1, performed the required algorithms to locate the target object and calculate its offset from the center of the finding aperture, calculated the required ST small slew vectors, transmitted them to the PIT and thence to the HSP EGSE which commanded the star simulator to move. This motion simulates the ST slew. The process was then repeated to verify the object had moved to the correct location. All of this was done in an automated fashion as envisioned for VAP. Only one detail remains: to ask the object to be directed to another smaller aperture rather than the center of the finding aperture. This will demonstrate that correct vector addition is being performed in the NSSC-1. This loop closing is a significant milestone because in order for it to work, most of the elements of the system must work. It exercises the HSP end to end, the EGSE, the star simulator, the SI C&DH system simulator, the science data transfer interface, the application processor, and the simulator to EGSE communication link.

B. Schedule

As discussed in the technical section, the PCDS schedule was revised extensively in February. The VAP start date may slip one week to March 14 to accommodate the repair of the system controller.

C. Problems

The PCDS continues to be a concern, as is the VAP/A&V planning issue.

D. Science Section

Progress has been made in manufacturing narrow band (~100A) short wavelength filters (λ<1600) with reasonable transmission (5-10%). A date has not been established for installation of the flight filters. That date must be set after the overall ST schedule has been revised and settled.

E. Documentation

The preliminary User's Guide discussed in last month's report is being prepared for delivery in early March.

F. CCB Activity

SI OTA/SSM PIRNs	Action
2192	Approved 2/9

SI OTA/SSM PSCNs	Action
2022	Approved 2/9

SI C&DH PIRNs	Action
8183	Approved 2/9
8184	Approved 2/9
8185	Approved 2/28
8186	Approved 2/18
8187	Approved 2/18
8188	Approved 2/22

SAV-1000A CCBD	Action
CCR No. 704	In Review

G. HRS MGSE

Claude Edwards reviewed the HRS MGSE progress and test results in February. One result of the review was to produce an HRS simulator so the MGSE hardware could be exercised before delivery. This would also serve as a training aid for HRS personnel. The HRS simulator was completed and the various procedures verified late in the month. A few minor hardware and procedure modifications are being made. We plan to ship the HRS MGSE to BASD on March 14.

H. TSU

We continue to support the latch test program at MSFC by providing information and documentation. A ROM cost estimate to refurbish the TSU for the ST maintenance mission was submitted in February.

D. Johnson
SS/Sp. Telescope file

DR-MA-02 Number 56
Issued: June 10, 1983

Monthly Report

for

April - May 1983

SPACE TELESCOPE HIGH SPEED PHOTOMETER

Contract No.: NAS5-24487
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Prepared by

Space Science and Engineering Center
University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

A. Technical Section

The last electrical design details were completed in April with the tests of the pre-regulator breadboard. The pre-regulator PWB layout was complete and ready to be shipped to the board manufacturer. The digital and detector boards were expected to ship from the manufacturer in late May. Layout work on the relay/monitor/filter circuit boards is progressing on schedule. One module housing was completed, is now being inspected and tested, and the production run is beginning at an outside machine shop. The modules will be made on NC machines because they can be produced faster and at less cost. Parts have not all been received and those that are well overdue have been reordered. Present delivery promises indicate all parts should be received my mid-June. Additional personnel will be added in June for assembly and test. One person will be assigned to track parts on a daily basis. Efforts are being made to improve the presently planned completion date.

The repaired HVPS S/N 2 failed in April. The failure symptoms were the same as the original failures and the blue flash was observed at the high voltage connector as before. The connector was removed and analyzed. There were distinct cracks in the insulation at the point where the connector mounting hardware meets the body of the connector. The cracks were black, which indicates carbon tracks. The cracks in the connector insulation are apparently caused by stress from the potting material, Conap EN-11, which has a fairly high coefficient of thermal expansion, and tends to get hard in cold temperatures. The connector is rigidly mounted to the wall of the HVPS enclosure, and is acted upon by a large volume of potting material. Connectors from several previously failed HVPS were examined and found to have been severely stressed. The corrective action will be to stress relieve the connection between the HV connector and the resistor to which it is connected, and to change the potting around the connector (i.e., in the repaired area) to Dow Corning DC 93-500, which has a lower thermal expansion coefficient and remains flexible at low temperature (-50 degrees C). Tests have been run to verify that the DC 93-500 is not inhibited by, and will adhere to, Conap EN-11. We intend to obtain sufficient parts and material to replace the entire HV section of the HVPS should the repair later prove inadequate.

Troubleshooting continues on the flight spare system controller, which failed in pre-conformal coat tests. It appears to be a memory problem and will be pursued as time allows. Since it is a spare it does not command a high priority.

The major effort in the period besides the PCDS was the preparation for VAP. Tests began at GSFC on May 17, but did not progress as rapidly as planned because of numerous problems. The Rockwell (non-flight) PCDS was thought to have failed because the input EMI filter and the power bus isolation diodes were incompatible. The PCDS was removed, returned to Madison for repair, and found to be functioning. The new PCDS has been designed to be compatible with the power bus isolation diodes.

All of the single instrument VAP tests have been coded and checked to the extent possible using the simulator and engineering model at Wisconsin, with the exception of target acquisition. Progress on developing a target acquisition test procedure has been inhibited by the need to support the VAP tests at GSFC. It is possible that the procedure will be ready when needed, due to the slippage at GSFC.

To date, there has been no further effort to analyze the EGSE monitor mode problem. It has been difficult to generate any interest in the problem at GSFC because of the strong competition with other problems and the concern about schedule. Unless we can troubleshoot the problem, the monitor mode will be unavailable if needed.

The second acoustic test was completed successfully in April. No significant motion of optical elements was detected.

B. Schedule

The PCDS schedule is being met, but the project office has requested the schedule be improved by about six weeks so the new PCDS will be installed in the first week of November. We are attempting to make such an improvement, but it is not clear at this time if it will be possible.

C. Problems

The PCDS schedule is the major problem. Other problems are the numerous VAP problems, which make planning and personnel scheduling difficult, and the continuing concern about A&V planning.

D. Science Section

The next team meeting has been scheduled for Sept. 19 at GSFC.

E. Documentation

No report.

F. CCB Activity

SI C&DH PIRNS	Action
8176R1	In review

STE-11 CCR	Action
777	Unable to assess 5/2

SO-03 CCRs	Action
769	Approved 5/11
770	Approved 5/11
771	Approved 5/11

D. Johnson
SSEC / Space Telescope

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Monthly Report

for

August - October 1983

SPACE TELESCOPE HIGH SPEED PHOTOMETER

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University of Wisconsin

for

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland

HSP Monthly Report for August-October 1983

A. Technical Section

All PCDS II qualification module testing was completed successfully including vibration and temperature tests. At the end of the period, six of the nine flight power supply modules were assembled and ready for pre-conformal coat tests. Wiring of the enclosure is well along and is expected to be completed in early December. There are still two parts in screening required for the first unit and several more for the second unit. Delivery of the first unit is now expected in early to mid-January. The enclosure will be taken to GSFC in mid-November for a fit check in the HSP.

Various solutions to the HVPS problem were evaluated early in the period and one was selected and implemented. The repair consists of depotting and replacing the high voltage output connector, rearranging some components to provide strain relief to the connector, and repotting with Conap EN-11 leaving the HV connector unpotted. The unpotted volume is vented by means of two vent holes. Three units have been repaired and tested, including a four week thermal vacuum test, and will be installed in the HSP in mid November. The three removed from the HSP will be repaired and two will be installed in January.

Single instrument VAP tests continued during the period until the end of August when there was a pause until late October. The formats and modes test which makes extensive use of the NSSC-1 stored program commands is the major uncompleted test. Recent enhancements in the VAP system should make it easier to assemble the command load for this test.

B. Schedule

The first PCDS II flight unit is expected to be delivered to GSFC in early to mid-January. The last two repaired HVPS should be ready for delivery at the same time. The second PCDS II flight unit is expected to be ready for delivery by April 1.

C. Problems

There are no major problems to report at this time.

D. Science Section

There was an IDT meeting at GSFC on September 19. The next team meeting is scheduled for mid December.

E. Documentation

No report

F. CCB Activity

SI C&DH PIRNS	Action
8176R2	In review
8183R1	In review
8194	Not approved

SI SSM/OTA PIRNS	Action
2193	In review
2194R1	In review

SMO-1000 PIRNS	Action
MK042	In review
MK044	In review

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