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DATA REQUIREMENT (DR) MA-03

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PAYLOAD MISSIONS INTEGRATION

PROGRESS REPORT

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## ABSTRACT

This document summarizes Teledyne Brown Engineering's (TBE) progress on the Payload Missions Integration Contract (PMIC) during the report period from August 11, 1983, through September 16, 1983. It fulfills the requirements of Data Requirement (DR) MA-03 Progress Report.

  
for R. A. K. Mitchell  
Payload Missions Integration Division

## TABLE OF CONTENTS

		Page
1	INTRODUCTION . . . . .	1-1
2	MANAGEMENT SUMMARY . . . . .	2-1
3	GENERAL . . . . .	3-1
4	SPACELAB MISSION NO. 1 . . . . .	4-1
5	SPACELAB MISSION NO. 2 . . . . .	5-1
6	SPACELAB MISSION NO. 3 . . . . .	6-1
7	OFFICE OF SPACE AND TERRESTRIAL APPLICATION (OSTA) PARTIAL PAYLOADS . . . . .	7-1
8	ASTRO-1 MISSION. . . . .	8-1
9	PREMISSION DEFINITION . . . . .	9-1
10	MISSION PECULIAR EQUIPMENT SUPPORT STRUCTURE . . . . .	10-1

## 1. INTRODUCTION

This report is organized for use by the Spacelab Payload Project Office (SPPPO). The Management Summary summarizes the contents of the report. The General Section provides information which concerns two or more missions or is nonmission oriented. The Missions' Sections provide information relative to payload integration progress on the specific missions for which TBE is responsible in its PMI contractor role.

Within each section of the report, information is organized in Work Breakdown Structure (WBS) number sequence. Only active WBS elements are identified by number and title for reporting purposes.

## 2. MANAGEMENT SUMMARY

Highlights of the PMIC contract effort during this period are summarized below.

### General

- One Supplemental Agreement (SA) was negotiated that added 16,000 hours and \$573,367 to the contract value.
- Responses were submitted to nine Change Order Modifications (C/O Mods) during the period, one Engineering Change Proposal (ECP) with a cost impact was submitted, and responses are being prepared for five other C/O Mods.

### Spacelab Mission No. 1 (SL-1)

- Two shipments of stowage MPE were made to KSC in time to meet the September 14 closeout date.
- Support was provided for the Phase II Flight Readiness Review (FRR).
- Mission Manager's payload integration support at KSC continued.
- Extensive support was provided for simulations conducted at the Payload Operations Control Center (POCC) at JSC and at the Huntsville Operations Support Center (HOSC) at MSFC.

### Spacelab Mission No. 2 (SL-2)

- Cruciform and Payload Clamp Assembly (PCA) installation and removal procedures were delivered.
- The Cruciform Weight and Center of Gravity (CG) Test was completed. The weight was 34 lb less than calculated. All work on the cruciform will be completed soon.
- We supported the GSE and Ground Operations Phase II Safety Review at KSC.

### Spacelab Mission No. 3 (SL-3)

- MPE for Racks 6, 9, and 11 is nearing completion. Shipment to KSC is planned on or before September 30.
- The collection of MPE verification data for the Acceptance Review has begun.
- Ten major assembly/installation and staging drawings were completed and baselined this period.
- Structural fixes for Racks 3, 5, 6, 7, and 9 were documented this period.

### Office of Space and Terrestrial Application (OSTA) Partial Payloads

- All CAST-1 MPE is now in fabrication. Piece parts are approximately 70 percent complete.
- MSL-1 MPE fabrication has been authorized and initial work has started.
- OAST-1 MPE parts and assembly drawings are 100 percent complete.
- The Middeck Electronic Module (MEM) design was completed and the CDR data package was delivered for review.
- We supported the OAST-1 Payload Operations Working Group at JSC and the Payload Ground Operations Working Group (PGOWG) at KSC.
- An OAST-1 payload sneak circuit analysis was completed.
- CAST-1 interim deintegration requirements were submitted on September 1. MSL-1 baseline deintegration requirements were submitted on September 14.

### Astro-1 Mission

- Approximately 75 detail design drawings for "early need" items are in checking.
- Significant progress was made in all subsystem integration disciplines.

- The Wide Field Camera (WFC) PDR data package was completed and delivered.
- Baseline review of the IIAs is underway. Reviews should be completed by the end of September.
- The MPE Development Plan was revised and reissued. Weekly MPE Development Status Meetings are being held.

#### Premission Definition

- The MSL-2 IPL RR Data Package was prepared and delivered on September 1, 1983. The team meeting and preboard were supported.
- The MSL-2 Experiment Tape Recorder (ETR) was ordered and the System Control Unit (SCU) requirements were defined.
- MSL-2 MPE design drawings are 30 percent complete.
- Piece parts for the MSL-2 MPESS (S/N 006) are 25 percent complete.
- Work on the Dedicated Discipline Laboratory (DDL) Cost Effectiveness Study progressed well.
- Tasks 1, 2, and 4.1 of the Study Plan for SMICA Implementation have been completed. Tasks 3 and 4.2 will be completed by mid-November.

#### Mission Peculiar Equipment Support Structure

- All work on MPESS S/N 003 is complete. It is ready for buildup and assembly of the SL-3 MPE.
- MPESS S/N 004 is ready for OAST-1 MPE integration.



### 3. GENERAL

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#### WBS 05.0 - PROJECT MANAGEMENT

#### WBS 05.1 - Performance Management and Administration

The project management contract deliverables this period were the DR MA-04, Financial Management Reports submitted on August 17 and September 14. No progress report was issued in July because a comprehensive PMIC/SPPQ Management Review was held on August 11. The view-graph package for this review served as the progress report, with SPPQ's concurrence.

SA MSFC-240, which added 16,000 hours and \$573,367 to the contract, was negotiated and incorporated into the contract during this period. It closed C/O Mod MSFC-188. Two other SAs (MSFC-248 and MSFC-252) were negotiated and are being finalized. SA MSFC-248 will add 21,950 hours and \$950,351 and close C/O Mods MSFC-187 and 192. SA MSFC-252 will add 20,889 hours and \$843,586 and close C/O Mods MSFC-202, 208, 210, 212, 221, 222, 223, 224, 227, 231, 232, 234, 237, and 238 and ECPs 91F and 96F.

Responses were submitted to nine C/O Mods during the period. MSFC-241 added WBS 05.5 study hours; MSFC-242 incorporated WBS 75.9 and 95.4 scope modifications; MSFC-243 added WBS 35.1 hours and material dollars for multimission work; MSFC-245 added WBS 35.1 hours and dollars for MSL-1; MSFC-246, 253, 254, and 255 added WBS 05.5 study hours; and MSFC-257 added WBS 35.1 hours and dollars for OAST-1. One FCP (ECP-102) with a cost impact was also submitted.

Responses are being prepared for C/O Mod MSFC-236 that modified the Astro-1 scope and schedule; MSFC-244 that requested SL-3 Ames Research Center rack work; MSFC-247 that added Astro-1 Wide Field Camera work; MSFC-256 that added SL-1 WBS 95.0 work; and MSFC-258 that requested SL-1 flight evaluation support.

There are currently 23 change proposals with a cost impact in the MSFC technical review or procurement processing cycle.

## WBS 05.2 - Information Management

During this period, PMIC Information Management coordinated the reproduction of 2,431,171 pages in support of various SPP0 and PMIC documentation requirements. We added 78 new documents to our master files and coordinated, published, and distributed the July 1983 Spacelab Payloads and Applications and Technology Project Management Reports.

## WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

### WBS 75.10 - Safety and Quality Assurance

A letter was submitted to NASA requesting a change to our contract to reflect increased quality effort beyond the scope of NHB 5300.4(1C) and to increase manpower to comply with NASA's request for additional effort on quality assurance document control.

A new quality engineer (Roger McCombs) was hired to support Astro-1.

#### 4. SPACELAB MISSION NO. 1

##### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

##### WBS 35.1 - Mission Peculiar Equipment (MPE)

Two shipments of SL-1 stowage MPE were made to KSC this period. The middle shelf stowage hardware was shipped on August 26, and the additional HDRR tape stowage hardware was shipped on September 9, 1983.

##### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

##### WBS 75.2 - MPE DESIGN

We continued to modify the flight stowage support hardware design to accommodate stowage of additional flight items. These changes were extensive and required quick turnaround to meet the Spacelab closeout date of September 14, 1983.

##### WBS 75.9 Ground Operations Analysis and Requirements Definition

We continued to support KSC activities through GIRD maintenance.

##### WBS 75.11 - Configuration Change Coordination and Processing

During this period, we prepared and distributed to the review team the SL-1 Phase II FRR Package, which contained all Engineering Change Requests (ECRs), Deviations, Waivers, Field Engineering Changes (FECs), and Problem Reports (PRs) approved after May 19, 1983.

We continued to process ECRs and ECPs submitted to the SL-1 Configuration Control Boards (CCBs) both Level II and Level III MPE. We processed 32 ECRs through the Level II CCB, and 4 ECRs through the Level III MPE CCB.

##### WBS 75.12 - Interface Agreements

Update of the IIAs, the VFI Interface Control Document (ICD), and the MPE Requirements Document continued with change page development for approved ECRs.

##### WBS 75.13 - Integrated Payload Compatibility

Structural verification cleanup work continued on the stress analysis of stowed items. Miscellaneous cable ties and stowage container

straps were evaluated during the last month. All margins of safety remain positive.

The Mission Manager's Payload Integration Support Group at KSC continued to support the payload activities at KSC. We are also supporting the SL-1 simulation activities at the POCC at JSC and the HOSC at MSFC in preparation for the SL-1 October launch.

#### WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

##### WBS 95.1 - Onboard Flight/Mission Operations

Preparation of the final Payload Flight Data File (PFDF) items continued throughout the reporting period. The final issues of 90 percent of the PFDF items have been published and distributed. PFDFs were prepared and maintained to support Integrated Training/Proficiency Training (IT/PT) conducted at MSFC during July, August, and September 1983 and to support the initial Joint Integrated Simulations (JIS) conducted at JSC, which were supported from the HOSC and the Payload Crew Training Complex (PCTC) at MSFC.

Support was provided in the PCTC to prepare for and conduct the IT/PT.

##### WBS 95.2 - POCC Requirements

We supported the final POCC data base verification effort by sending two people to JSC during the week of August 22, 1983. During September 1983, we prepared a data base to support HOSC operations during the mission.

New layouts of the POCC Cadre Room, POCC User Room, and Off-line User Area Room were prepared to support a MSFC review in September 1983.

The initial JIS was conducted during the last week of July 1983. A change in the JIS schedule provided the needed time to prepare for and conduct simulations, beginning with a 30-hour launch and activation simulation starting on September 15, 1983, followed by a 75-hour simulation starting on September 19, 1983. In preparation for these simulations, we attended meetings at JSC on August 8-9 and August 29-30, 1983. Additional effort was applied to this task in the form of one individual with experience in the area of mission operations by means of a subcontract to TBE.

During this time period, Revision A of the POCC Data Base Maintenance and Verification System Users Guide, JA-332, was delivered to Mr. Archie Jackson, NASA/MSFC/EL14. Nine copies were delivered. This document reflects all modifications made to the system between February 1983 and July 1983.

A three-man element of support is being provided to the Statusing and Reporting Section of the SL-1 Mission HOSC Operations Team. This element will assist by maintaining Payload Charts on a 24-hour basis for both the JIS and the SL-1 mission. We participated in the JIS conducted on September 15, 1983.

#### WBS 95.3 - Payload Data Processing Requirements

Approximately three weeks of effort went into preparations for a 4-day meeting that we attended at GSFC during the week of August 29, 1983, to address data processing requirements and problems with the PIs. Assistance will be provided in developing the Orbiter Ancillary Data Processing Requirements at MSFC.

#### WBS 95.4 - Public Affairs Inflight Video and Photographic Requirements

We continued to update the content of the TV/Photo Operations Book as a result of training and changes to coverage requirements. A 2-day scene development exercise was conducted during the week of September 5, 1983, in support of this update effort. A complete Revision A of the TV/Photo Operations Book will be published in October 1983.

We manned the TV Ops position in the POCC for the initial JIS in late July and early August 1983 and for the 30-hour simulation starting on September 15, 1983. The final issue of the operating procedures for the POCC TV Operation position (DR FI-16) was prepared and delivered on September 15, 1983.

TV operations training was provided to the payload crew in the PCTC on September 8, 1983. The training consisted of both classroom work and work in the mockup of the SL-1 module.

## 5. SPACELAB MISSION NO. 2

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

##### General

Procedures (per DR G0-03) for Off-Loading/Handling of the PCA, Reassembly of the PCA, PCA/Cruciform Fit-Check, and Cruciform Unloading/Unpacking were completed and delivered on September 3, 1983.

##### Cruciform

A Weight and CG Test was performed on the SL-2 Cruciform. After completion of this test, the cable standoffs were cemented in place. The remaining velcro pads have been installed. Upon completion of a contract with MDTSCO, the VFI components, cables, and insulation blankets will be installed.

##### Network Cables

Twenty network cables were completed, tested, and vacuum baked and then shipped to KSC on September 1, 1983. Two cables were withheld from this shipment to incorporate EOs. These will be delivered later.

##### Mockups

The previously delivered Experiment 10 (HRTS) mockup was modified and delivered back to Building 4708 for incorporation with the Cruciform mockup. Mockups for the PCA Clamp Actuation System were also completed and delivered to MSFC for determination of actuation cable lengths and mounting schemes. Both of these deliveries were made on September 9, 1983.

##### REM Control Box MLI Blanket

The flight MLI blanket for the REM Control Box was delivered to MSFC on September 16, 1983.

WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

WBS 75.2 - MPE Final Design

We provided technical support at the joint ESA/NASA review of the Spacelab 2/IPS Interface Control Document (ICD) and provided drawings and data to close out TBD areas.

Updates were completed on the Cruciform Part I and II CEI Specifications to incorporate the latest hardware changes by ESA.

We updated and submitted revisions to the Experiment 6 MLI Blanket designs to accommodate changes recommended by the University of Chicago. We also submitted design drawings for the Experiment 10 MLI Blankets.

The Cruciform Engineering Mockup was updated, and we reviewed the Experiment 10 thermal tent configuration with the Naval Research Laboratory. Significant changes are required to incorporate new design requirements identified during the meeting.

An analysis was performed on a RAU/support bracket interface to provide data to alleviate an S&E concern about reduced support area in the interface.

The Cruciform and PCA NASTRAN Models were combined to form a composite Cruciform/PCA Model. Updates to experiment locations and experiment/Cruciform interface modeling were incorporated. Two studies were performed using the composite model: a relative stiffness study for the Cruciform and PCA, and a prediction of the combined Cruciform/PCA launch/landing frequency.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

We initiated the development of deintegration requirements approximately two months ahead of schedule and continued GIRD maintenance.

WBS 75.10 - Safety and Quality Assurance

Materials were prepared and presented at the SL-2 GSE and Ground Operations Phase II Safety Review at KSC. The Safety Panel indicated that the review was sufficient to allow the Phase III Review to be

accomplished by submitting change pages and performing the review by letter.

Safety compliance data were developed for MLI blankets for two SL-2 experiment coldplates.

#### WBS 75.11 - Configuration Change Coordination and Processing

We continued to process ECRs and ECPs against baselined documentation. This effort encompassed the preparation of PCN folders, the tracking of the change data in the SCIT, the distribution of change evaluation requests, and the preparation and processing of CCB Directives for changes submitted to SPP0. We published a weekly SL-2 Open Action Report, K014, and a TBE Drawing Release List (DRL) which reflects all SL-2 MPE CEIs being built by TBE.

We submitted revised MLI Blanket drawings for Experiment 6 to JA53 for review. The following ECPs were released to SPP0:

<u>NO.</u>	<u>TITLE</u>	<u>CEI</u>
TBE 99F	Revised OSP Signal and Power Cable Harness Lengths	NA
TBE 101F	Revised Velcro Pile Drawing, F2-30095	Cruciform
TBE 103F	Incorporate GFE Hardware and Mounting Provisions for Actuator Flex Shaft	PCA

We continued to perform the configuration management requirements for the MPE being designed by MSFC/S&E and controlled by the Spacelab Payloads MPE, Level III CCB. We published a monthly Spacelab Payload MPE (MSFC/JA51) Drawing Release List, PMIC-DRL-3774, which reflects all releases authorized by this CCB.

We prepared agendas and minutes for the SL-2 Payload Level II CCB which met August 11, 1983, and August 29, 1983.

#### WBS 75.12 - Interface Agreements

ECRs were submitted to revise Experiment 5 connector identification and add cable lengths; change bonding grease from B rated to A rated for Experiments 8, 9, 10, and 11, and add cable lengths to Experiment 3; update the weight and CG and external dimensions for



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Experiment 9; and define the CG for Experiment 7. Three approved ECRs were incorporated into the SL-2 IIAs and distributed.

WBS 75.13 - Integrated Payload Compatibility

We incorporated an ECR into the IPRD to update the loads and add Experiment 14 and general update data. An IPRD ECR is in process to incorporate Experiment 14 resources, interfaces, and weight data.

The measured weight and CG data for the Cruciform Structure Assembly was submitted. The measured weight was 34 pounds less than calculated and the CG moved aft by 1.92 inches, which is a plus for the Cruciform structural loading.

Revised structural verification items were reviewed for Experiment 7. Additional discrepancies were brought to the attention of the PI. A review of the Experiment 14 verification analysis is presently being performed.

Fracture control analyses for Experiments 7 and 9 are in progress.

WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

WBS 95.1 - Onboard Flight/Mission Operations

Revisions were made to the Experiment Simulator Model Requirements (ESMR) for Experiment 8 and provided to EL12 for review. Revision A to the ESMR for Experiment 10 was delivered to EL12 on August 2, 1983.

WBS 95.2 - POCC Requirements

Work continued on the POCC data base with the telemetry part of the data base being nearly complete. Revisions are expected, pending receipt of an updated IP&CL.

Work started on updating the POCC data base definition as it applies to the Spacelab Missions.

WBS 95.3 - Payload Data Processing Requirements

We continued to monitor the requirements for this mission.

## 6. SPACELAB MISSION NO. 3

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### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

MPE for Racks 6, 9, and 11 is nearing completion and will be shipped to KSC on or before September 30, 1983.

Parts for the ESS Assembly are nearing completion. Preliminary fitup of the Utility Bridge to MPESS S/N 003 is presently being accomplished. Assembly of the Payload Adapter is scheduled to begin September 26, 1983. The IONS Support Pedestal piece parts are now complete and assembly is scheduled to start October 3, 1983. The ATMOS Support Structure is approximately 60 percent complete. Rack 4 hardware is nearing completion, with fitup scheduled to begin October 3, 1983. The underfloor MPE is approximately 70 percent complete and is scheduled for completion by October 7. The underfloor fitup will then begin.

Rack post reinforcement angles are presently being fabricated for Racks 6, 9, 11, 5, and 7, and are scheduled for completion October 3, 1983.

The MSFC Test Lab is fabricating the fluid line hard tubing pieces, and these are approximately 60 percent complete.

The water loop and Freon loop flex hoses are on order. Freon loop hoses are scheduled to be at TBE September 27, 1983; water loop hoses are scheduled to be in on November 7, 1983.

We created a new matrix for MPE verification on a rack-by-rack basis, and implemented a system for collecting and tracking MPE verification items. The collection of data for the MPE Acceptance Review was initiated.

### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

#### WBS 75.1 - Configuration Design Definition

The following assembly/installation and staging drawings were completed and baselined during this reporting period:

- F3-80036 REV A, Rack 3 Staging
- FE-80037 REV A, Rack 4 Staging
- F3-80041 REV A, Rack 5 Staging
- F3-80038 REV A, Rack 6 Staging
- F3-80042 REV A, Rack 7 Staging
- F3-80043, Rack 8 Staging
- F3-80039 REV A, Rack 9 Staging
- F3-80040, Rack 11 Staging
- F3-10026 REV A, Rack 6 Assembly
- F3-10027 REV A, Rack 9 Assembly

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We reviewed JPL's DDM assembly and detail drawings and noted several discrepancies. We then met with JPL's technical representative and resolved these discrepancies.

We completed the preliminary analysis of current stowage requirements and a recommended approach to the stowage configuration. We established locator codes for the module configuration and updated the stowage list per ARCLSP changes.

#### WBS 75.2 MPE Design

MPE design documentation completed during this reporting period included:

- Structural fixes for Racks 5 and 7, which included one assembly/modification drawing and 14 detail drawings
- Structural fixes for Racks 3, 6, and 9, which included eight detail drawings.

A design concept to remove a potential structural failure in the ESS Payload Adapter was proposed, and preliminary design sketches were made. A second "base-drive" analysis was performed to assess the potential fixes.

Analyses were performed in support of procurement of hardware for the MPE Fluid Loop, the Freon Loop, and the Vacuum Vent System. These studies included determining the impact of changes in the design of the ECS subsystems.

Coordination of the MPE Fluid Loop test continued. Test requirements were developed.

ECRs were prepared to incorporate changes to the MPE cable design drawings that resulted from CCTV subsystem reconfiguration.

The design of a new cable harness, internal to the GFFC experiment, was initiated to alleviate a test problem at the developer's facility.

#### WBS 75.3 - Command/Data/Communication System Integration

ATMOS verification data was reviewed for technical compliance with the verification data requirements. No problems were noted in the data provided, however, all verification data requirements have not been met.

#### WBS 75.5 - Environmental System Integration

Studies were performed to assess the effect of launch delays and the impact of an additional crewman.

#### WBS 75.6 - Electrical System Integration

Verification review items were completed for the UMI, DDM, ARCLSP, and GFFC experiments. Analyses of electrical MPE assemblies were initiated to facilitate completion of MPE verification review items.

#### WBS 75.7 - Structural/Mechanical System Integration

We completed the structural analysis of fixes to eliminate negative margins of safety in three experiment developers' racks (dedicated), Racks 5, 7, and 8. These supplemental analyses were delivered to the experiment developers.

We completed the checking of the Rack 4 analysis for MPE verification. Checking of the analysis of the underfloor area for MPE verification is currently in progress. We completed analytical verification of all MPE in Racks 6, 9, and 11.

We reviewed approximately 15 structural verification items submitted by experiment developers.

The Fracture Control Plan for MPE (DR IR-56) was updated to include GFFC MPE. The fracture control analysis for the DDM experiment in Rack 8 was also updated. This update resulted from fixes incorporated in Rack 9 to eliminate negative margins of safety, which altered the stresses in Rack 8 and the DDM experiment.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

We continued development of deintegration requirements and GIRD maintenance. The deintegration requirements are approximately 5 weeks ahead of schedule. Inputs were provided to our Systems Engineering personnel for IIA updating. Effort was also expended to prepare for the Pre-Level IV Integration Coordination Meeting at KSC on September 21 and 22, 1983.

WBS 75.10 - Safety and Quality Assurance

Lists were prepared which specify the type of safety data still required for verification of the SL-3 experiments. Several telecons were conducted and data acquired. The KSC GSE and Ground Operations Phase III Package is in preparation and will be submitted during the next review period.

WBS 75.11 - Configuration Management

Activities this period required coordination with the MSFC Level II CCB, the MSFC Level III MPE Board, and the TBE/PMIC Level IV CCB. We submitted to the MSFC Level II Board the directives required to obtain approval of TBE/PMIC prepared Revision A to previously baselined Racks 3, 4, 5, 6, 7, and 9 staging configuration drawings; baseline Racks 8 and 11 staging configuration drawings; baseline instrument interface agreements (IIAs) for Experiments 3AFLO2/3AVCO6, and 3SHF15; and baseline the SL-3 Payload Installation/Assembly Drawing F3-10022. We submitted to the MSFC Level III Board the directives required to baseline TBE/PMIC-prepared reinforcing angle drawings for Racks 5 and 7. We processed through the TBE/PMIC Level IV Board 27 Class II Engineering Change Orders (ECOs), 4 drawing revisions, and 10 reinforcing angle drawings for Racks 3, 6, and 9.

We continued to process and track assigned actions to close Discrepancy Notices (DNs) submitted against the various milestone review data packages. On a regular basis, we published reports reflecting SL-3 baselined documents and open change activities, the TBE DRL, and the DN Open Action Status Report.

#### WBS 75.12 - Interface Agreements

The FES/VCGS, ARCLSP, and MICG IIAs are still in the baselining process and should all be baselined in the next reporting period. An ECR to the IONS IIA is also being prepared.

#### WBS 75.13 - Integrated Payload Compatibility

We completed ECR TBE 3-0169 for the SL-3 IPRD (109 pages). We also completed revised verification plans for the DDM, ATMOS, MICG, and AFT experiments. Numerous instrument verification items were processed.

#### WBS 75.14 - Mass Properties

We released Mass Properties Quarterly Report No. 19 and updated the SL-3 data base per experiment changes. We assisted in the stowage analysis effort and supported verification item reviews on instrument hardware.

#### WBS 95.0 - PAYLOAD FLIGHT OPERATIONS INTEGRATION

#### WBS 95.2 - POCC Requirements

Preparation of the POCC data base continued. A revision to Annex 5 (POCC Requirements) to the Payload Integration Plan (PIP) is in progress.

#### WBS 95.3 - Payload Data Processing Requirements

We continued to monitor the data processing requirements for the mission. Work started on an update of the format of the requirements documents (DR FI-06).

## 7. OSTA PARTIAL PAYLOADS

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

All OAST-1 MPE is in the fabrication shop, and the piece parts are now approximately 70 percent complete. Tooling and GHE designs are approximately 50 percent complete, and the hardware is approximately 35 percent complete. All MPE attachment hardware is either on order or on hand. No problems are anticipated with attachment hardware. The SCCF mounting plate was completed, painted, and shipped to Lockheed on September 12, 1983. The DAE Alignment Procedure has been completed and is awaiting CCB action. The MPE Assembly Procedure is being updated.

Our manufacturing division has been authorized to proceed with fabrication of MSL-1 MPE. The shoulder bolts have been completed and the raw materials for the "Gas Can Beams" have been received and rough cut to size. Machining is scheduled to start the first week in October.

### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

#### WBS 75.2 MPE Design

One hundred percent completion of the OAST-1 MPE parts and assembly drawings was achieved.

Verification review items for the OAST-1 SAE experiment were assessed and completed. Technical requirements and design support were provided to facilitate the final design of a Power Control Box Heater Assembly for the OAST-1 payload.

Final design documentation packages for the OAST-1 payload were revised to reflect the addition of fuse modules. These were provided to protect wiring between the SAE experiment and the Aft Flight Deck Deployment and Pointing Panel per JSC interface requirements. Documentation revised included the cable interconnect diagram, end-to-end system schematic, cable assembly drawings, and Part I and Part II CEI specifications.

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MSL-1 MPE drawings were updated to show new attachments for the MLI grounding straps. Also, approval of MSL-1 Deviation Approval Request (TBE 043) was received during this period.

The MEM design was completed during this period. A CDR data package was submitted to MSFC for review.

A breadboard of all the TBE-designed electronics was built and exercised in the development laboratory. Each circuit performed without known problems.

The development of the MEM is behind schedule due to late delivery of the GFE tape recorder and apparent problems in the tape recorder. Problems were encountered in reading data from the tape recorder. Different results were obtained when attempting to read from all four tracks. It has also been observed that the read electronics does not reconstitute all bit patterns equally. It is believed that the read electronics contains a low pass filter that was designed for the 4-IPS tape recorder. This unit was modified to operate at 12 IPS. The result of this problem is a severe attenuation of a consecutive string of "1" or "0."

Fabrication of the MEM breadboard enclosure and ADSF simulator is nearing completion. This unit will be complete by October 1. If the tape recorder problem can be solved, the breadboard unit will support simulated ADSF operational (simulated mission timeline) tests to verify the capability of the unit to record the data over a complete mission.

PC board layout and basic board fabrication of the data acquisition and tape recorder control board will be subcontracted to a CAD/CAM firm. TBE will then stuff the board, solder, and conformal coat the assembly. The procurement package for this board is complete and we are ready to initiate procurement. Modification of the SEP enclosure to convert to a MEM will begin when the CDR DNs are received, reviewed, and incorporated into the drawings such that they may be baselined and released to manufacturing.



WBS 75.4 - Command and Data Requirements

On August 23 and 24, we participated in the OAST-1 Payload Operations Working Group meeting at JSC. Subsequently, we began to prepare a Data Change Request (DCR) for a PIP Annex 4 update based upon JSC and MSFC comments. Also, a memorandum with updates for the Functional Subsystem Software Requirements (FSSR) Document is being prepared.

During the period, we participated in telecons with the JSC Crew Training Branch (Keven Koley) regarding OAST-1 MCDS display pages. In addition, we have prepared recommended Annex 4 and FSSR changes to display the SAE containment box oven temperature, and have suggested OAST-1 ground displays for MCC and HOSC, with cross-correlation tables and item descriptions.

WBS 75.5 - Environmental System Integration

Timelined analyses were performed to determine the maximum temperature of the OAST-1 DAE tape recorder. The analyses showed the tape recorder to exceed the maximum allowable temperature if the recorder is painted white. A subsequent analysis indicated that the recorder would remain within allowable temperature if it was covered with silverized Teflon. The analyses were documented and a technical memorandum was sent to SPP0.

WBS 75.6 - Electrical Systems Integration

An end-to-end sneak circuit analysis of the OAST-1 payload was completed and delivered on schedule.

WBS 75.8 - Pointing/Stabilization Systems Integration

Two tasks were pursued for the study being performed to resolve OAST-1 DN 2-452-2873. First, revised aerodynamic data from JSC was incorporated into the OSOS computer code. Second, a STS-4 gravity-gradient, free-drift simulation was run using the revised OSOS program. We are presently awaiting data from JSC to use in verifying this simulation.

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The STS Flight Control System (FCS) simulation used in the OSOS computer program was previously found to be obsolete. During this period, an update to the FCS coding was initiated.

WBS 75.9 - Ground Operations Analysis and Requirements Definition

The OAST-1 interim deintegration requirements were submitted to the SPPO for review on September 1, 1983, approximately two months ahead of schedule. GIRD maintenance continued and inputs to update the IIAs were provided to our Systems Engineering group. We also supported and participated in the PGOWG at KSC on September 12 through 15, 1983.

The MSL-1 baseline deintegration requirements were completed and submitted to the SPPO on September 14, 1983, 10 weeks ahead of the scheduled November 25, 1983, contractual date. We continued MSL-1 GIRD maintenance activities.

WBS 75.10 - Safety and Quality Assurance

The OAST-1 GSE and Ground Operations Safety Data Package for the KSC Phase II Safety Review was delivered to MSFC for comments. The resulting comments were incorporated and the data package was submitted for transmittal to KSC.

A revised issue of the SAE Safety Data Package was received and is currently being reviewed.

WBS 75.11 - Configuration Change Coordination and Processing

We continued to process all ECPs against the current OSTA-2 baseline. This effort included incorporation of outstanding ECOs into revised drawings which are to be used in staging of the MSL-1 mission (Reference ECP TBE 100F). We published a weekly Partial Payload Open Action Report, K32A, which listed all outstanding open actions against OSTA-2 baselined documentation, and published the monthly TBE DRL reflecting all OSTA-2 MPE CEIs being built by TBE.

We continued to process all ECRs and ECPs against the current OAST-1 and MSL-1 baselines. This effort included preparation of PCN folders, processing of change evaluation requests, tracking changes in SCIT, and preparation of CCBDs. We published a weekly Partial Payload

Open Action Report, K32A, which lists all outstanding open actions against OAST-1 and MSL-1 baselined documentation.

We continued to track DN open actions and published the actions in the monthly Partial Payload DN SCIT Report, K062. There are currently five open MSL-1 DNs.

We baselined the OAST-1 GIRD, JA-141, and submitted the OAST-1 IPL Verification Plan, JA-148, and the OAST-1 Payload Installation/ Assembly Drawing and Parts List (F4-10030) to MSFC for evaluation and baselining. All OAST-1 CEI Specifications and associated detail/ assembly drawings have been baselined, except the OAST-1 Thermal and Electrical MPE Part II CEI Specifications and Drawing F4-20003.

Currently, all MSL-1 Level II documentation (IIAs, IPRD, PID, IPL Verification Plan, A&I Drawings) has been baselined, except the MSL-1 GIRD, JA-143. The MSL-1 GIRD has been reviewed by MSFC, comments have been incorporated, and it has been resubmitted for baselining.

All MSL-1 CEI Specifications and associated detail/assembly drawings have been baselined.

During this period, we processed numerous MSFC Middeck drawing ECRs and ECOs and continued to process DN closeouts for the DNs submitted against the various Middeck experiment milestone review data packages. We baselined the ADSF GIRD, JA-249, and the ADSF IPRD, JA-284. We baselined the IEF IPL System Verification Plan, JA-252, and the IEF GIRD, JA-248.

#### WBS 75.12 - Interface Agreements

A CCB meeting was held on August 19, 1983, to review the revised ECR to the SCCF IIA and several ECRs to the SAE IIA. Some of the ECRs were approved with noted changes and others will be reviewed again.

An ECR was submitted to the DAE IIA.

Some of the ECRs were processed with a CCBD, and document revisions will be made for submission to the repository.

WBS 75.13 - Integrated Payload Compatibility

We processed several DN closeouts which were related to delivery of the proposed OAST-1 baseline assembly and installation drawings for MSFC review.

We attended the OAST-1 POWG meeting at JSC on August 24 and 25, 1983. Discussion was centered around a detailed STS-14 timeline draft showing 3 days of dedicated OAST-1 operation.

We participated in a telecon with Rockwell personnel on September 9, 1983, to discuss proposed changes to the OAST-1 ICD. The impact of these changes, which primarily concerns connectors at the SIP interfaces, is currently being evaluated.

To ensure interface compatibility, the SCCF interface plate (hardware) was shipped to JPL during this period, as requested.

We attended and participated in regularly scheduled OAST-1 payload working group meetings at MSFC. An interface action was taken by MSFC to determine the requirements for caps or connectors on experiment and GFP nonflight connectors. No determination has been made at this time.

SAE verification progressed well to the point of having 41 verification requirements approved with 15 remaining open. These 15 open items are scheduled to be closed by November 1. Several of these requirements are being held open awaiting receipt of the final stress analysis from LMSC (due September 1). Five of the fifteen are awaiting waivers.

The SCCF IRR data package was received. On preliminary examination, the data appears adequate to close/satisfy all but nine of the requirements. Primarily, those remaining open include thermal and external optical properties and mass properties. Thermal and optical properties will be available when the final selections of paint are made, and mass properties will only be available shortly before shipment to KSC.

Manufacturing route sheets are being accumulated to support the OAST-1 structural MPE verification effort.

The OAST-1 Metallic and Nonmetallic Materials List was approved by the M&P Laboratory of MSFC during this report period.

We still have not received an approved MEA-A2 Verification Plan or the similarity statement (certifying degree of similarity to MEA-A1) needed to close most of the verification requirements.

The MSL-1 MPE Verification Summary Reports (DR IR-52s) for structural/mechanical and electrical MPE were published with all verification items open. No hardware will be completed before November 1, 1983.

The Verification Summary Report (DR IR-51) for the MSL-1 IPL was published with all verification items closed, but with five experiment and MPE items open.

#### WBS 75.14 - Mass Properties

The final OSTA-2 weighing data was received.

The OAST-1 Mass Properties Status Report No. 4 (DR IR-05) was submitted August 1, 1983.

The MSL-1 Mass Properties Status Report No. 4 (DR IR-05) was submitted August 15, 1983.

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## 8. ASTRO-1 MISSION

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### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

#### WBS 35.1 - Mission Peculiar Equipment (MPE)

The two titanium pieces (5 1/2 in. by 5 1/2 in. by 14 in.) for the WUPPE were shipped to the University of Wisconsin on September 2, 1983. The 4 in. and 2 1/2 in. aluminum plates for the cruciform fabrication are still scheduled to arrive at TBE by September 30, 1983.

### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

#### WBS 75.2 - MPE Design

The design group began or continued Astro-1 detail design work in a number of areas during this reporting period, resulting in delivery of approximately 75 drawings for checking. Areas of primary emphasis were:

- Cruciform blade envelope drawings which are required by manufacturing to begin tooling design
- Cruciform blade, ring, and trunnion detail drawings which are required for early start of fabrication
- Cruciform simulator GSE drawings which are needed to support cable routing, MLI fitup, access, and clearance studies
- Alignment GSE which is needed early to support alignment activities.

The stress group prepared and delivered the following documents:

- The PDR Alignment and Stability Analysis
- Astro-1 Coupled Loads Models for the Cruciform and PCA.

Each of these documents was the culmination of computer modeling and supporting analysis.

Other significant activities included the following:

- The determination, by stress and dynamic analyses, of the Cruciform blades' dimensions

- The remodeling and reanalysis of the Integrated Radiator System (IRS) due to new component location requirements
- The development of automated procedures for: simplifying the complex data assimilation associated with alignment and stability analyses with varying thermal data, and accurately applying rotational acceleration load factors to the Cruciform (a capability which NASTRAN does not provide)
- The analysis of a proposed invar mounting plate for the Optical Sensor Package (OSP)
- The final analysis of the three telescope alignment simulators and alignment holding fixtures.

The Thermal Analysis group's Astro-1 activities during the reporting period were as follows:

- Cruciform sensitivity studies were performed. Six of the sixteen cases were completed. The temperature data was transmitted for deflection analyses.
- Thermal analyses were performed to assess the feasibility of hand-mounting the DRIRU II to the Cruciform and eliminating the flexible heat pipe from the DRIRU II to the IRS. The studies indicated this to be feasible and provided the data for sizing of the DRIRU II heaters.
- The IRS thermal analyses continued. The analyses have provided:
  - Definition of an acceptable location for the electronic boxes
  - Confirmation of the heater sizing
  - Definition of the number and location of longitudinal heat pipes for the IRS.

An IRS meeting was held at GSFC. The topic was the thermal design of the IRS, with emphasis on the heat pipes.

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The heat pipe request for proposal (RFP) was completed and sent to TBE Purchasing. The RFP will be sent to seven vendors.

- Thermal modeling of the PCA started. The TRASYS model is now being coded.
- Test planning for the IRS is underway. Test requirements and capabilities of the test chamber are being defined.
- DNS resulting from the MPE PDR are being resolved.
- Effort started on defining the VFI requirements.

#### WBS 75.3 - Command Data/Communications Systems Integration

During this period, we prepared the following documents for the WFC PDR: Data Handling Unit (DHU) Performance Specification, DHU Furnace Specification, and Vendor Subassembly Data (Power Supply, Chassis, Wirewrap Boards). We also participated in the PDR and demonstrated the DHU breadboard assembly.

WFC laboratory development activities started during this period. Except for a crystal, all WFC DHU breadboard parts have been received. The card cage is assembled. We tested purchased software for operation of the 8073 microinterpreter, acting as a Z8 simulator. The software will be utilized for DHU firmware test, operation, and storage. We began the wirewrap wire test using VT180 automated WIREMASTER software.

#### WBS 75.6 - Electrical System Integration

Preliminary design and documentation requirements for the Wide Field Camera PDR data package were met on schedule with the delivery of a cable design drawing, a cable design and performance specification, a cable interconnect diagram, an electrical system schematic, an electrical/electronic/electromechanical parts list, and an electromagnetic compatibility test procedure. A schematic for the Wide Field Camera Data Handling Unit Command Interpreter was also included in the PDR data package.



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The selection of Astro-1 VFI temperature sensors and matching signal conditioners was initiated as thermal requirements were identified. Limiting parameters affecting data accuracy are being assessed for impact.

WBS 75.7 - Structural/Mechanical System Integration

Astro-1 Wide Field Camera preliminary design activities were completed on schedule to support the WFC PDR.

The design group supplied preliminary drawings of the internal and external configuration of the WFC Canister and Cruciform mounting concept drawings for the canister as well as for the Data Handling Unit Electronics Box.

Design personnel completed a trip to work out interface problems between the WFC and the VARO Corporation image intensifiers, and also supported all PDR meetings.

The analysis group performed, prepared, and delivered on schedule the preliminary structural and thermal analyses required to support the WFC PDR. In each case, preliminary models were prepared and used to provide data that was included in the PDR analysis documents.

WBS 75.10 - Safety and Quality Assurance

The preliminary FMEA of the PCA/Cruciform latching/release operations was completed. Additional data was received and will be incorporated in the analysis.

WBS 75.11 - Configuration Change Coordination and Processing

During this period, we supported several Astro-1 design reviews. We assembled and distributed the Astro-1 MPE PDR data package, and tracked all data package DNs in the SCIT Computer System. We supported the Astro-1 IPL IDE and MPE PDR preboard and board meetings and prepared and distributed the minutes for these meetings. We also assembled and delivered the data package for the Wide Field Camera PDR.

WBS 75.12 - Interface Agreements

Work continued to incorporate RIDs from the IPL IDE into IIAs for WUPPE, UIT, and HUT. The status as of September 16, 1983, is as follows:

<u>DOCUMENT</u>	<u>RIDs RECEIVED</u>	<u>INCORPORATED</u>	<u>PENDING INPUT</u>
IIA WUPPE	23	19	4
IIA UIT	8	6	2
IIA HUT	27	20	7

A baseline review of the above IIAs was initiated during this period. The WUPPE review was completed September 15 at Wisconsin, with UIT and HUT reviews scheduled for the last week in September. Each document will undergo major revisions as a result of these reviews. A date for baselining each document has not yet been determined.

An evaluation of access to WUPPE electronics connectors at the telescope was completed and submitted for information.

Isometric layout drawings are being developed for the integrated Cruciform to provide an early assessment of cable routing and general access.

WBS 75.13 - Integrated Payload Compatibility

The IPRD is being revised based on RIDs generated during the IPL IDE review. The present status is as follows:

	<u>RIDs INCORPORATED</u>	<u>RIDs OUTSTANDING</u>
IPRD	19	4

The four open RIDs are awaiting data from MSFC.

DNs generated against the MPE PDR data package are being incorporated in the Astro-1 design documentation. Present status is as follows:

<u>TOTAL DNs GENERATED</u>	<u>WITHDRAWN</u>	<u>CLOSED</u>	<u>OPEN</u>
123	10	68	45

Effort is underway to baseline the TBE MPE Systems Requirements Document. During the period, DNs were incorporated and results from

the PCA Deploy and Restow analyses, mechanical and thermal interface definition between the IRS and electronic boxes, and VFI system requirements were added. Plans are to baseline the document in early October 1983.

Systems Engineering continued analyses on the PCA Deploy and Restow Study and developed a preliminary FMEA for the PCA at the mission systems level. Major changes were made to the Deploy and Restow budget for the Pitch = 0 phase in the Systems Requirements Document based upon a better understanding of the error sources.

A list of questions and data requirements was prepared concerning the ESA IPS and Rockwell clamps required as inputs to the Deploy and Restow Analyses for the IPS/Astro configuration. Where data were not available, assumptions were made by TBE and presented to NASA as the basis for continuing analyses until better data is available.

Special Astro-1 requirements for the Rockwell clamps to be used on the PCA were presented to Rockwell and to NASA. Also, a new concept for carrying axial loads into a longeron clamp was reviewed for possible incorporation into the Astro PCA to eliminate the need for a keel clamp.

The Astro-1 verification program continued with revisions to the Cruciform, MLI and Mounting Hardware Verification Plan, the IRS Verification Plan, and the PCA Verification Plan. In addition, a fourth document, the VFI Preliminary Verification Plan, has been prepared for review. Special test plans in support of the four basic verification documents are in preparation for an October-November period review before the CDR. The special test plans include the Telescope Alignment Test Plan, the Pallet/PCA/Cruciform Alignment Test Plan, the IRS Thermal Vacuum Test Plan, and the IRS Acoustical Test Plan. Considerable progress is being made in the definition of special plan test fidelity and GSE requirements.

Verification plans from the HUT, UIT, and WUPPE CDR data packages were reviewed and are in the process of being reformatted to reflect the TBE verification format. The new format will specify data

requirements that shall be sent by NASA to the experimenters for PI concurrence.

A logging system was implemented to control weight/mass properties data inputs to the data base. Biweekly weight status reporting was instituted based on preliminary drawing releases. The latest estimate of the current TBE MPE weight shows the limit weight set by the Mission Manager to be exceeded by 190 kg.

The MPE Development Plan was revised and issued to incorporate major changes in verification test schedules since MPE PDR.

Weekly MPE Development Status Meetings are now being held. The purpose of the meetings is to jointly review Astro development status as it pertains to design, manufacturing, procurement, testing, and procedures with a view towards identifying potential problem areas.

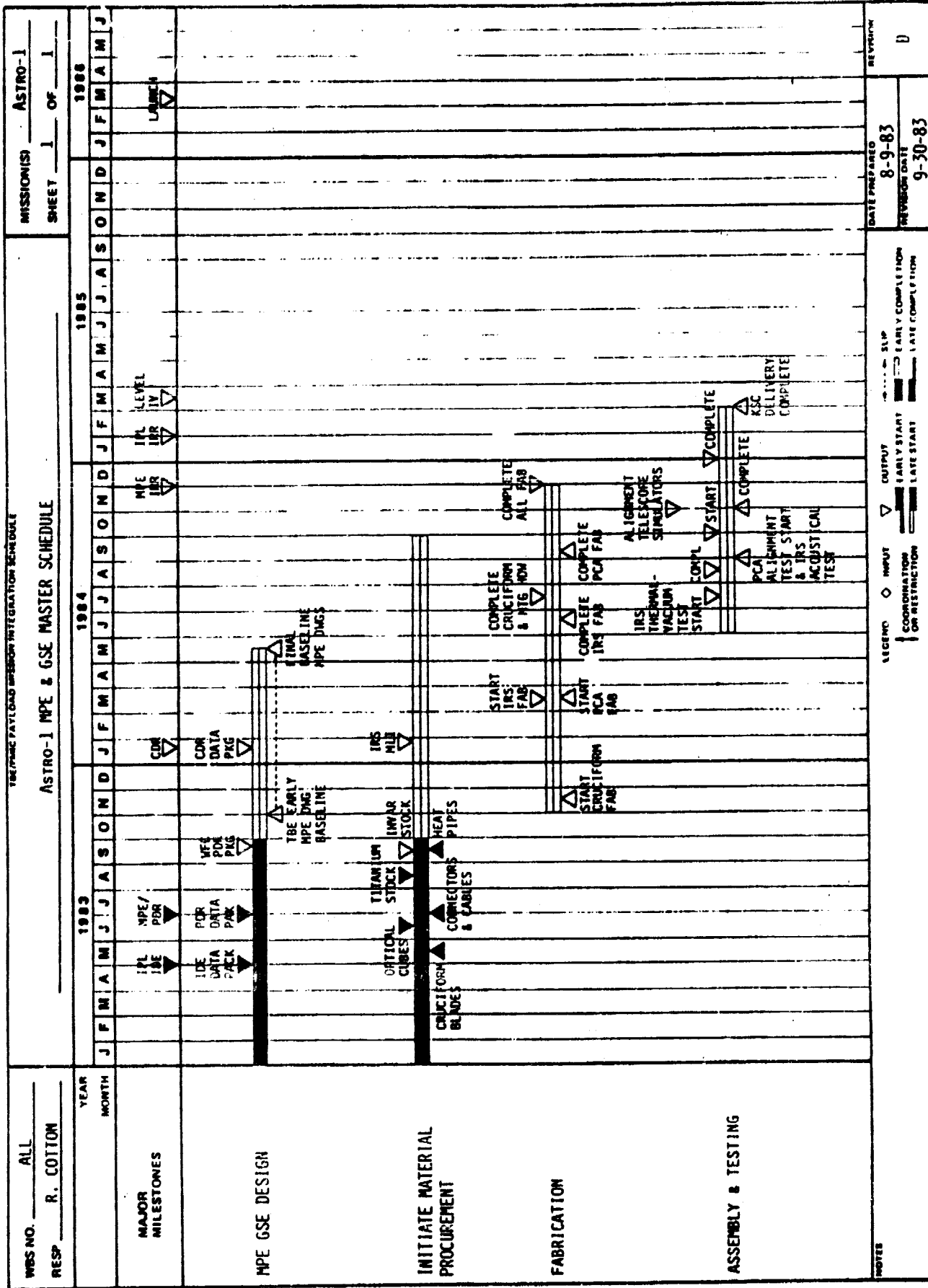
Procurement of long lead time items, such as titanium, invar, heat pipes, optical cubes, and aluminum plate has been initiated.

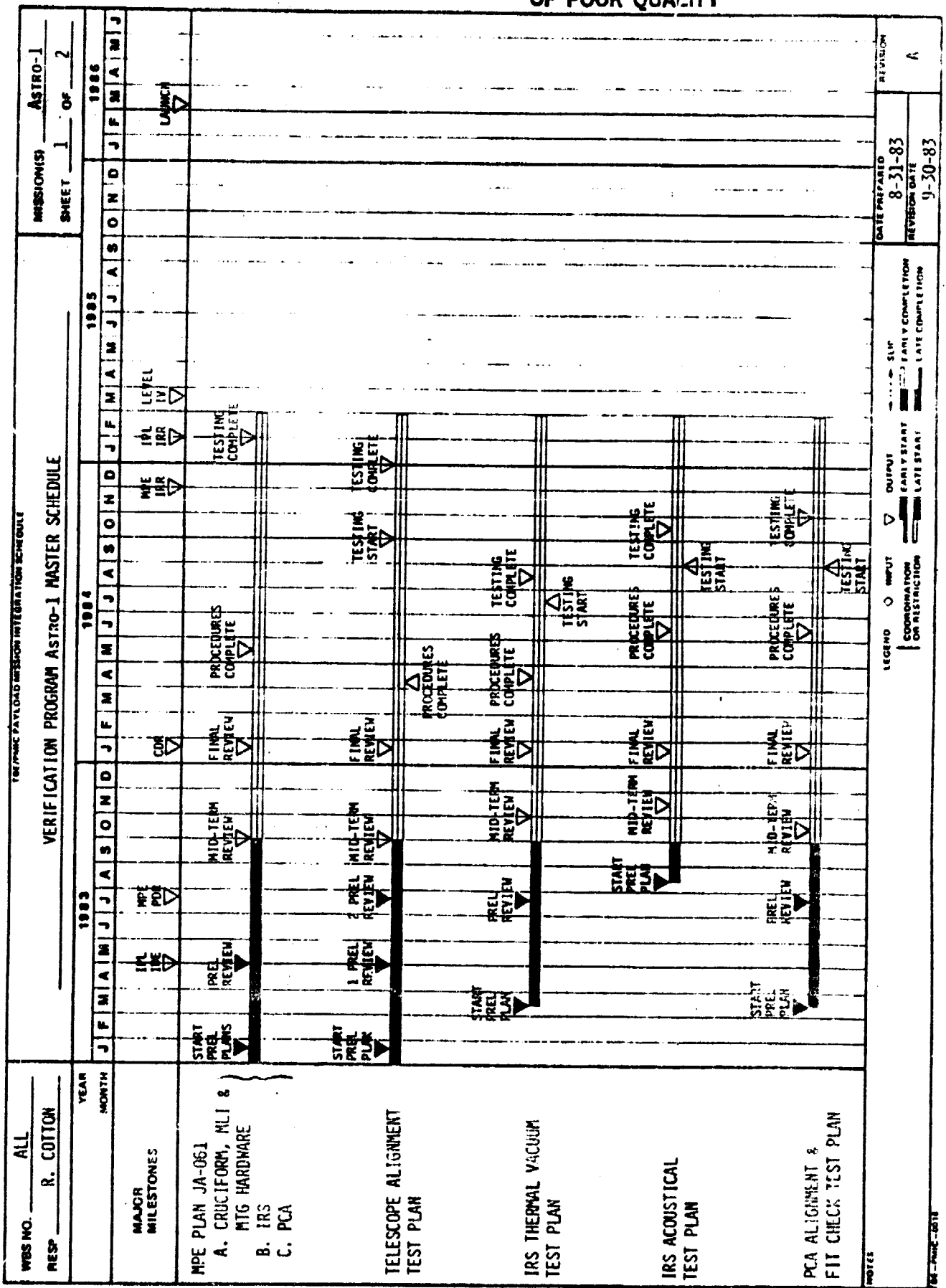
A progress review for the Wide Field Camera was held August 18, 1983. Concerns expressed at the meeting were worked for incorporation into the PDR documentation.

The PDR for the Wide Field Camera was held September 13-15, 1983. The following documents were submitted for review:

- Experiment Requirements Document
- CEI Part I Specification
- Preliminary Design Drawings
- Preliminary Design Analyses
- Preliminary Parts and Materials List
- Preliminary Verification Plan
- Cable Interconnect Diagram
- EMC Test Procedures
- Electrical System Schematic

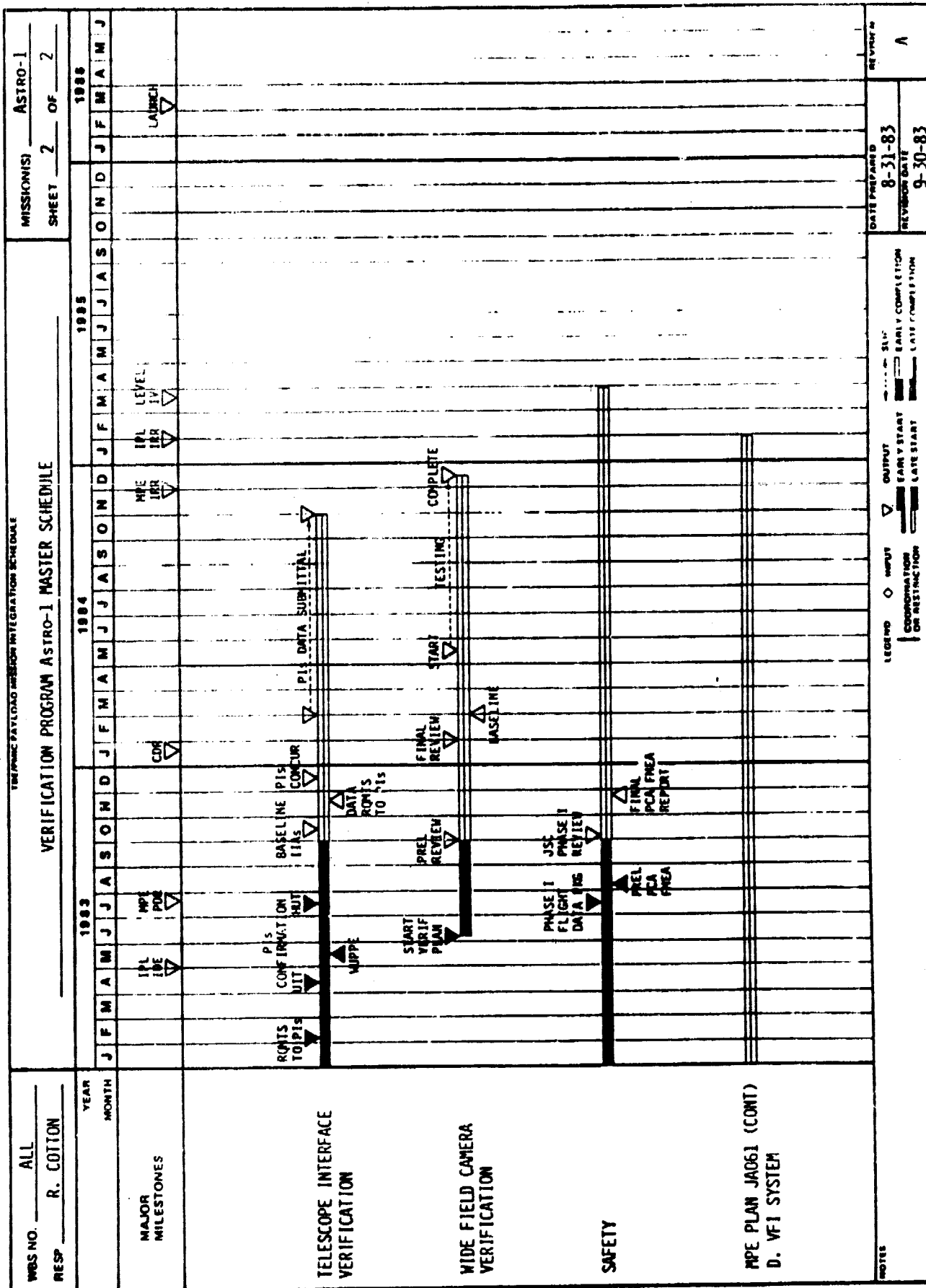
Astro-1 Master Schedules are contained on the next five pages.

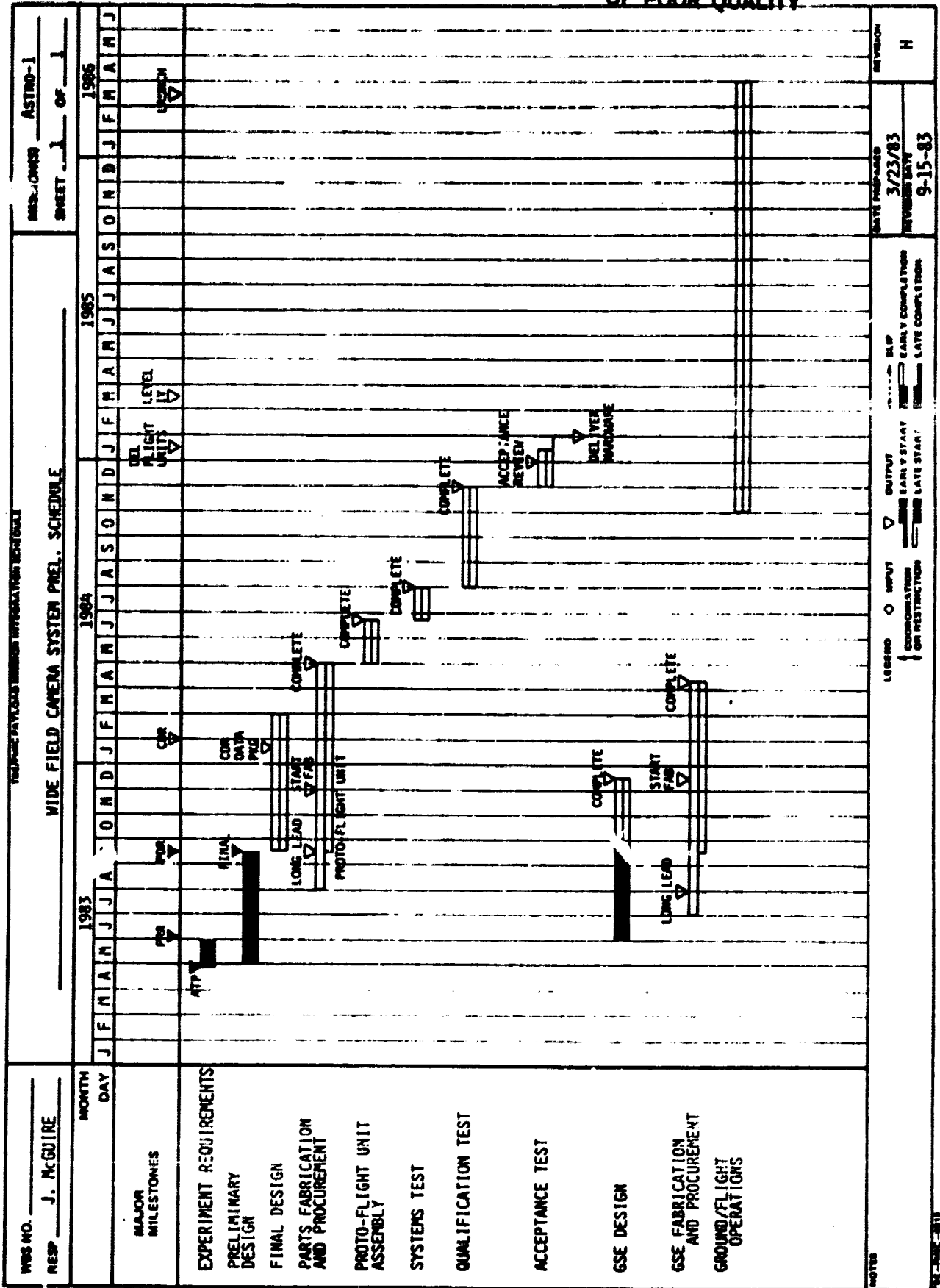




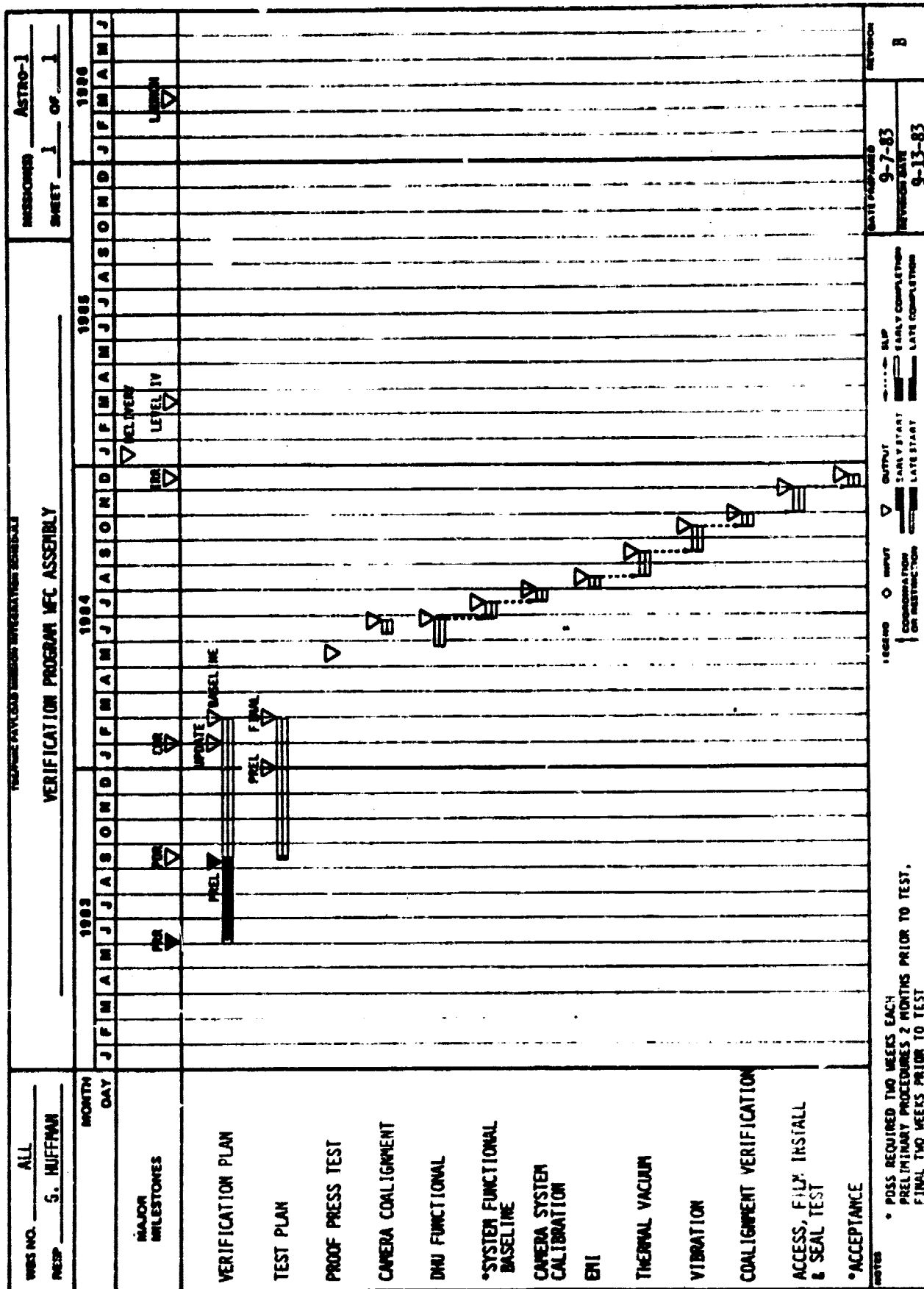
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LEGEND:   
 ○ INPUT   
 ◻ OUTPUT   
 ◻ COORDINATION OR RESTRICTION   
 ◻ SLIP   
 ◻ EARLY START   
 ◻ EARLY COMPLETION   
 ◻ LATE START   
 ◻ LATE COMPLETION









## 9. PREMISSION DEFINITION

TD-JA02-83-02, dated June 9, 1983, authorized the performance of the MSL-2 Premission Definition Study. This study activity consists of the initial payload integration work on the MSL-2 mission.

The MSL-2 IPL RR Data Package was submitted on September 1, as scheduled. The following list identifies the documents prepared and submitted by TBE as parts of this data package.

- EML Instrument Interface Agreement (JA-367)
- ADSF Instrument Interface Agreement (JA-366)
- 3AAL Instrument Interface Agreement (JA-368)
- MSL System Specification (B1-4-0056-TBE)
- MSL Payload Configuration Drawings
- PIP Annex 1, Payload Data Package (JSC 18425/1)
- PIP Annex 4, Orbiter Command and Data (JSC 18425/4)
- PIP Annex 6, Orbiter Crew Compartment (JSC 18425/6)
- MSL-2 Experiment Interface Summary (PMIC-RPT-3899)
- System Control Unit (SCU) (B1-4-0058-TBE).

The team meeting and the preboard for this review were supported. A total of 84 DNs was received and dispositioned by TBE for this review.

An MSL-2 Payload Ground Processing Presentation was made August 24, 1983. Technical support was provided to prepare and give this presentation.

During this period, the primary CDMS accomplishments were the ordering of the Experiment Tape Recorder (ETR) and the definition of requirements for the SCU.

The OEX Bell and Howell MARS 1400 ETR Specification was selected following discussions with GSFC regarding the applicability of the Goddard qualification testing unit to MSL-2. It was determined that the OEX version, as specified by JSC, better fitted the MSL-2 requirements, and the ETR was ordered on September 15, 1983.

The SCU CEI Part I Specification was submitted for MSFC review on September 12, 1983. In addition to the analog and discrete I/O cards, the specification definition included the ETR interface card, the Serial/Digital Input/Output (SDIG) interface card, and the LGAS interface card. Action items were accepted to consider a GPC data bus interface option to the SDIO, to support LGAS alternative studies, and to study backup alternatives in the event of SCU development delay. A presentation was given to recommend continuation of the SDIO development instead of undertaking GPC data bus interface development. A letter summarizing the presentation was submitted at MSFC's request. The LGAS alternative study, conducted by MSFC, is scheduled for completion on September 23, 1983. The SCU Backup Tradeoff Study conducted by TBE is scheduled for presentation on September 18, 1983.

In the area of SCU and SCU GSE software, the definition of the requirements was initiated. Contact was made with the Information and Electronics Systems Laboratory. A meeting to discuss our software approach will be scheduled in the near future.

Preliminary configuration layouts were prepared in support of the MSL-2 RR. MPE design drawings were started and are 30 percent complete.

The MSL-2 MPE NASTRAN Model was completed. This model will be used to perform stress analysis of the rails and crossties and to verify minimum natural frequency requirements. The Integrated Payload NASTRAN Structural Model was also completed. This model is being used to fine tune the MPESS design to meet the minimum frequency requirements.

Structural analyses for experiment and subsystem mounting hardware, including the coldplate support structure, are 60 percent completed.

Thermal analyses were performed to define the MPE thermal requirements. The thermal requirements were incorporated in the System Specification delivered at the RR. Thermal compatibility analyses were started. Preliminary Freon loop analyses were performed to assess the

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capability of the loop to meet the MSL-2 requirements. Thermal modeling of the MSL-2 payload started. The TRASYS model is being developed.

The piece parts for MPES S/N 006 are in fabrication and are approximately 25 percent. One machined end fitting is 90 percent complete and the other has not been started due to a machine breakdown. This machine is scheduled to be back in operation on September 27 and machining of the other end fitting will begin.

TD-JA02-83-04, dated August 8, 1983, authorized the performance of the Dedicated Discipline Laboratory (DDL) Cost-Effectiveness Study. A review of the 11 candidate DDLs has been made, and the Shuttle High Energy Astrophysics Laboratory (SHEAL) has been selected as the strawman for detailed study. A methodology has been established to determine the cost, schedule, and hardware impacts of various implementation options for the SHEAL flight/reflight scenario. With regard to analytical integration, the TBE cost model covering analytical experiment integration, MPE, and ground and flight software has been modified to reflect the SMICA new mission scenario and post-modification checkout/testing has been completed. With regard to physical integration, the assumption has been made that this is a level-of-effort activity and that cost correlates closely with activity duration. Schedule data has been compiled that pertains to various integration/deintegration scenarios. The methodology will be applied to a set of SHEAL configurations to determine the cost/schedule sensitivities of various implementation options and will result in the identification of a preferred approach.

TD-JA02-83-05, dated August 9, 1983, directed TBE to prepare an arrow network and associated activity description documentation based on the SL-6 mission. This activity is underway.

TD-JA02-83-06, dated August 17, 1983, directed TBE to perform additional SMICA study work. Task 1, as described in the Study Plan for SMICA Implementation Tasks dated July 20, 1983, has been completed and the results were submitted in Technical Letter SP-SPP0-266(83) dated July 20, 1983. Task 2 has been completed and the results were submitted in Technical Letter SP-SPP0-269(83) dated August 31, 1983. Task 4.1

results were submitted with the study plan. Tasks remaining to be accomplished are Task 3, Compatibility and Cost Analysis of the NMS and the Proposed KSC Standard Integration Flow, and Task 4.2, Update to NMS Implementation Plan. These are due November 14, 1983.

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## 10. MISSION PECULIAR EQUIPMENT SUPPORT STRUCTURE

### WBS 35.0 - SUPPORT SYSTEM DEVELOPMENT

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#### WBS 35.1 - Mission Peculiar Equipment (MPE)

The Weight and CG Test on MPESS S/N 003 was performed on August 11, 1983. All work on this structure has been completed, and it is located in position to begin buildup and assembly of the SL-3 MPE.

Assembly operations, including an electrical bonding test, were completed on MPESS S/N 004 on August 18, 1983. This structure was painted and returned to the A&I Facility on August 26, 1983. The Weight and CG Test was performed on September 1, 1983. S/N 004 is complete and ready for OAST-1 MPE integration.

An updated and revised Operations and Maintenance Manual was prepared to cover operations with MPESS S/N 003 and subsequent MPESS units (P/N F4-30655). This updated manual includes the revised GSE to accommodate KSC integration stand operations and a section is devoted to recertification and inspection of the MPESS after a mission.

### WBS 75.0 - PAYLOAD INTEGRATION REQUIREMENTS

#### WBS 75.13 - Integrated Payload Compatibility

Recommendations for final closure of all S/N 002 DRs were transmitted on September 12, 1983. JSC agreed with dispositions.

We closed all open items on S/N 003 and its GHE except:

- 4.1.1.1 Weight
- 4.1.2.2 G.G.
- 4.1.2.3 Life Spectrum.

All 53 verification requirements on S/N 004 and its GHE are closed except:

- 4.1.1.1 Weight
- 4.1.1.2 C.G.
- 4.1.3.3 Life Spectrum.

Preparations are underway for the S/N 004 AR on September 28, 1983. All requirements will be closed except 4.1.3.3 Life Spectrum.

WBS 75.14 Mass Properties

MPESS S/N 003 was physically measured and compared to the calculated weight, and results were reported in PMIC-IR05-3613, entitled the "Actual Mass Properties Report for S/N 003," dated September 1983. The calculated Mass Properties Report for S/N 003 was reported in PMIC-IR05-3613, dated September 7, 1983

For MPESS S/N 004, a calculated mass properties report dated September 7, 1983, and an actual mass properties report dated September 1983 were prepared and verified for the physically measured unit.

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