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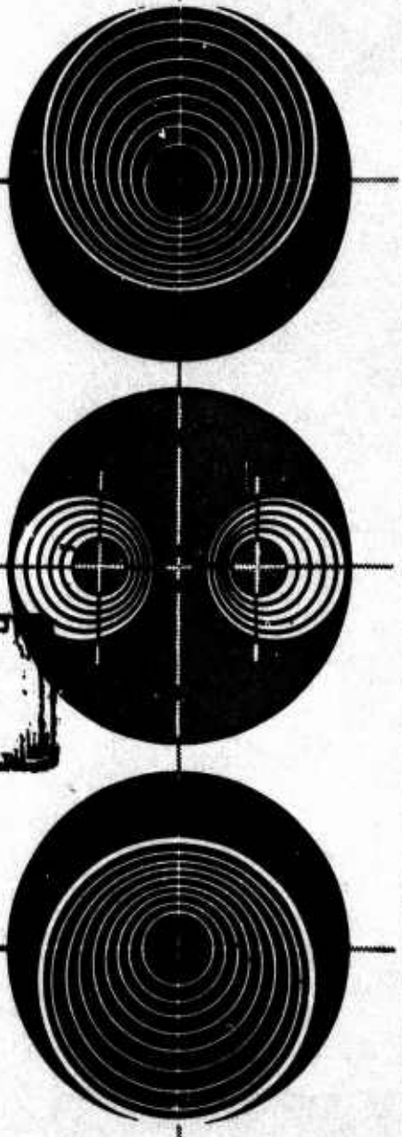
CONTRACT AF04(695)-150

PROGRAM PLAN
MANNED ORBITING LABORATORY–
HEAT SHIELD QUALIFICATION
(MOL-HSQ)

FINAL

OCTOBER 1965



prepared by

MARTIN
DENVER

prepared for

HEADQUARTERS
SPACE SYSTEMS DIVISION
AIR FORCE SYSTEMS COMMAND
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LOS ANGELES, CALIFORNIA 90045

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DENVER DIVISION

CONTRACT NO. AF04(695)-150

PROGRAM PLAN

CHANGE NOTICE

NO. 1
DATE 28 October 1965

SPEC NO.	SSD-CR-65-91
TITLE	Program Plan Manned Orbiting Laboratory – Heat Shield Qualification (MOL-HSQ)
DATED	October 1965
REVISION NO.	DATED

PURPOSE OF CHANGE:

This change modifies the MOL-HSQ Configuration Management Plan in certain areas to be more consistent with Titan III Configuration Management Procedures.

This change incorporates PPCNP-A (M40015) as approved by SCD P3-3214A, dated 25 October 1965 (Martin Ref. 5W15738).

INSTRUCTIONS:

This change is incorporated in the final released version of the Program Plan.

AUTHORIZATION: SCD P3-3214A, dated 25 October 1965 (Martin Ref. 5W15738).
Contracting Officers Letter SSHKT-3, dated 26 October 1965

File this page in front of subject document to indicate the latest change.

APPROVAL

FORM DEN 1016-01(11-63)

SSD-CR-65-91 Copy No. 9

Contract AF04(695)-150

PROGRAM PLAN
MANNED ORBITING LABORATORY - HEAT SHIELD QUALIFICATION (MOL-HSQ) (FINAL)

October 1965

Approved

R. B. Demoret, Program Manager
MOL-HSQ

MARTIN COMPANY
Denver, Colorado
Aerospace Division of Martin-Marietta Corporation

FOR OFFICIAL USE ONLY

FOREWORD

This document is submitted under Exhibit A, Task 5.13 of Contract AF04(695)-150, in accordance with line item 3C-1 of Contractor's Specification SSS-TIII-010 DRD (Rev. 3), dated 15 April 1965, DSCNs 1 through 106.

This document is approved by Contracting Officer's letter dated 29 July 1965 (Martin Reference 5-W-11129).

The title of this document has been changed from that shown in the DRD for consistency of terminology. The term MOL-EFT has been changed to MOL-HSQ in accordance with SSD letter dated 29 August 1965 (Martin Ref 5-W-12944).

CONTENTS

I. INTRODUCTION AND OBJECTIVES

The Space Systems Division (SSD) of the Air Force Systems Command plans to develop a Manned Orbiting Laboratory (MOL) system to assess man's ability in performing military space missions. The flight vehicle for this system is comprised of a modified Gemini Spacecraft and a specially designed Laboratory Vehicle launched by the Titan IIIC Standard Space Launch Vehicle. The Air Force plans to fly a simulated MOL payload as a part of the Titan III R&D program to obtain certain environmental and design assurance data and to substantiate the MOL/Titan III/facility compatibility. This flight, known as the Heat Shield Qualification (HSQ) flight, is the subject of th rogram plan.

The HSQ flight is suborbital from Eastern Test Range (ETR) with a launch azimuth of approximately 107 deg and has the following objectives:

- Verify the Gemini heat shield as modified to accommodate the MOL crew-transfer method;
- Collect data on ascent environment for the orbiting vehicle structure;
- Demonstrate structural integrity and control capability of the Titan IIIC for launch and ascent with a MOL-type payload;
- Demonstrate the MOL outboard profile compatibility with the ITL concept;
- Demonstrate recovery/retrieval techniques;
- Exercise selected segments of the MOL tracking network.

The flight vehicle defined to accomplish these objectives is comprised of:

- Titan IIIC launch vehicle with minor modifications to enable spacecraft separation and integrated countdown;
- Simulated Laboratory, fabricated from a surplus Titan II, Stage I oxidizer tank to approximate outboard profile, mass properties and structural characteristics of the anticipated MOL Laboratory and furnished with an independent telemetry system;

- Gemini Spacecraft, refurbished GT-2 previously flown to qualify Gemini A heat shield, and modified for crew transfer through the heat shield. This spacecraft has a "boilerplate" adapter to mate it to the Simulated Laboratory and active systems to enable separation, reentry, recovery and acquisition of pertinent experimental data during all flight phases.

The facilities and equipment required to receive, assemble, check out, and launch the HSQ flight vehicle at ETR are comprised of:

- Basic Titan III Integrated Transfer Launcher (ITL) Complex at ETR, including all facility and aerospace ground equipment (AGE), required to check out the Titan IIIC vehicle using normal ITL approach;

- Gemini-peculiar AGE, provided from existing Gemini A program on a minimum repackaging concept, to provide for assembly and checkout at the pad only;

- Simulated Laboratory-peculiar AGE, primarily to suit handling, access, and electrical simulation requirements, to provide for assembly and checkout throughout the ITL complex;

- ITL facility modifications, primarily to suit environmental control requirements for servicing and checking out the Gemini Spacecraft, but also involving other Gemini and Simulated Laboratory requirements;

- ITL AGE modifications required to accommodate the Simulated Laboratory, the Gemini Spacecraft, and AGE peculiar to them, and to provide an integrated preparation and launch operation consistent with the minimum Gemini repackaging concept. (ITL AGE modifications and installations required to suit Gemini are subject to separate contractual coverage.)

The Contractors selected to work with SSD/Aerospace to accomplish the HSQ program are listed below:

- Martin-Marietta Corporation, Denver Division has a threefold responsibility: (1) all hardware and services associated with the Simulated Laboratory and its peculiar AGE; (2) all modifications to the Titan III SSLV and Titan III AGE; and (3) integrating contractor through Gemini separation in flight;

- McDonnell Aircraft Corporation (MAC) under NASA and Air Force contracts has responsibility for all hardware and services associated with the Gemini Spacecraft and Gemini-peculiar AGE;

- Daniel, Mann, Johnson and Mendenhall (DMJM) has general architect/engineer responsibilities for ITL facility modifications, which include supporting Martin in preparing the Contract End Item Specification for ITL facility modifications.

This Program Plan outlines, in general terms, the overall aspects of the MOL-HSQ program, including the major actions and responsibilities of all associate contractors. The plan presents, in detail, the technical and management approaches to be used by the Martin Company in accomplishing the program objectives. The plan includes provisions for working interface problems and program schedules and controls in all areas of Martin responsibility.

This document is not a delineation of contractual requirements, but a plan for their accomplishment. It will not be updated or maintained. To the extent that plans presented here are not contractual requirements of this program, Martin reserves the right to change the plans without specific approval of the government.

II. PROGRAM GUIDELINES

A. PROGRAM GROUND RULES

The following ground rules or assumptions form the basis for the plans found in this volume:

1) The scope of work is covered by SSD-CR-64-152, Rev 7, dated 12 August 1965, as added to Contract AF04(695)-150 by SA 127, cited on SSD TWX SSHKT/17321, dated September 1965 (Martin Ref 5-W-13397).

2) The boost vehicle for this flight is SSLV 9, a Titan III, Configuration C, to be launched in October 1966 from ETR. The launch facility will be the Titan III Integrate-Transfer-Launch (ITL) system including the Vertical Integration Building (VIB), Cell No. 1, Solid Motor Assembly Building (SMAB), and Launch Pad P-40. For this mission, the payload objectives are secondary to those of the booster vehicle.

3) Overall system management is the responsibility of SSD; general system engineering and technical support to SSD is provided by Aerospace Corporation.

4) Martin is the integrating contractor for all program effort through Gemini separation.

5) Martin, as integrating contractor, in conjunction with DMJM and MAC, will prepare facility design criteria for the receipt, inspection, storage, maintenance, assembly, checkout, and launch of the MOL-HSQ vehicle.

6) A temporary enclosure for the Gemini spacecraft will be constructed at Pad P-40 only. All spacecraft checkout will be on-pad.

7) Cell P-4 at the Denver Vertical Test Fixture (VTF) will be modified to check out the Simulated Laboratory and Transtage of the booster.

8) The Gemini spacecraft and its supporting equipment will be furnished by MAC, designated the spacecraft contractor. The spacecraft will be delivered to the program at Pad P-40 at ETR.

9) MAC will be provided a temporary spacecraft enclosure on the Mobile Service Tower (MST) to meet requirements of internal pressure, humidity, and temperature.

10) The Laboratory/Gemini mechanical interface is Vehicle Station -327.0, the intersection of the cylindrical laboratory and the conical Gemini adapter.

11) The payload/Titan III interface is at Vehicle Station 77.0 of the Titan III standard core.

12) For the Martin hardware, maximum use will be made of existing design, tools, processes, procedures, facilities, etc. New tooling required will follow a soft concept.

13) For MAC hardware, maximum use will be made of existing Gemini A hardware and associated AGE. Modifications to Gemini AGE will be made with minimum repackaging.

14) Procedures for accomplishing the program at Martin follow a dual approach, i.e., for the effort concerned with the airborne hardware aft of Titan III Station 77.0 and its supporting ground equipment, Martin shall follow normal Titan III procedures and requirements, except as stated in Task 5.9.7 of Exhibit A as outlined in SA 127. For design and fabrication efforts forward of Station 77.0 airborne and supporting ground hardware, Martin shall follow a Model Shop procedure as described herein.

15) Martin Company will be responsible for maintenance of contractor-furnished equipment (CFE) and for government-furnished property (GFP) to the extent specified in the general provisions of AF04(695)-150 minor repair or replacement.

16) The existing Titan III spares support program will support the MOL-HSQ program where the parts are common. Peculiar spares will be provided by the MOL-HSQ program.

B. PROGRAM DOCUMENTATION

MOL-HSQ program documents that have been or are being prepared by the Martin Company are grouped into six basic categories:

1) Program documents;

2) Interface specifications;

3) Facility specification;

4) Contractor-furnished airborne equipment specifications;

5) Contractor-furnished ground equipment specifications;

6) Installation and checkout specification.

Table II-1 tabulates these documents by title and number.

Table II-1 MOL-HSQ Program Documents

Document Number	Document Title
Program Documents	
SSD-CR-64-152	Manned Orbiting Laboratory Early Flight Test Program (MOL-EFT) One Launch (HSQ) Program (Statement of Work)
SSD-CR-65-91	Program Plan, Manned Orbiting Laboratory - Heat Shield Qualification (MOL-HSQ) Final
SSD-CR-65-96	MOL-EFT Subsystem Test Plan
SSD-CR-63-200	Addendum to Detailed Test Plan - ETR Flight Test Program, Titan IIIC
SSD-CR-63-128 Rev 1	Addendum I to Program Support Requirements - AMR
SSD-CR-65-273	EMC Integrated Test Plan
Interface Specifications	
IFS-MOL-EFT-60001	Simulated Laboratory to Gemini Interface Specification
IFS-MOL-EFT-60002	Gemini/Gemini AGE to MC AGE
IFS-MOL-EFT-61001	Standard Space Launch Vehicle to Simulated Laboratory Interface Specification
IFS-MOL-EFT-61002	Simulated Laboratory/Transtage to MC AGE

Table II-1 (concl)

Document Number	Document Title
	Facility Specification
IFS-TIII-32000	Addendum I, Rev. I, Facility Contract End Item Specification, Part I, Performance and Design Requirements for TIII/MOL ITL Facilities at ETR
Contractor-Furnished Airborne Equipment Specifications	
MOL-EFT-AVE-1000 Rev 1	Airborne Vehicle Equipment Specification
SSS-TIII-010 SLV	Addendum M - Detailed Specification for Standard Space Launch Vehicle
Contractor-Furnished Ground Equipment Specifications	
MOL-EFT-AGE-4100 Rev 1	Aerospace Ground Equipment Specification
SSS-TIII-010 OGE	Addendum I - Model Specification for Operating Ground Equipment (OGE) for SSLV System
SSS-TIII-010 GIE	Addendum I - Model Specification for Ground Instrumentation Equipment (GIE) SSLV System
Installation and Checkout Specification	
MOL-EFT-ICS-5100	Installation and Checkout Specification for MOL-EFT AGE

C. GENERAL TASKS

To accomplish the objectives outlined in the Introduction and to meet the requirements of its contract, Martin will complete the following tasks:

Task 1 - Program Management - includes program planning, configuration management, data submittals, specification preparation, test planning, and general support as Integrating Contractor.

Task 2 - Airborne Vehicle Equipment - includes design, tool, fabricate, procure, and deliver one Simulated Laboratory with associated electrical and instrumentation equipment and modifications to Titan III Transtage.

Task 3 - Aerospace Ground Equipment - includes design, tool, fabricate, procure test, and deliver ground equipment and installation peculiar to the Simulated Laboratory and modifications to Titan III AGE.

Task 4 - Test - includes static limit load tests of the Simulated Laboratory and associated equipment and fit and acceptance tests of the Laboratory in the VTF at Denver and combined systems test (CST) including electromagnetic compatibility (EMC) tests at ETR.

Task 5 - Systems Support - includes engineering support for control of both MOL-peculiar hardware and standard Titan III hardware. Necessary studies and analyses as well as spares support are included in this task.

Task 6 - Launch Operations - includes the following items:

1) Install, checkout, and maintain Martin-supplied MOL-HSQ AGE and remove electrical mods to Titan III AGE at completion of program;

2) Prepare an installation and checkout specification for MOL-HSQ AGE, to reflect results of a Gemini AGE installation and checkout study;

3) Transport, erect, and integrate the checkout of the Simulated Laboratory and install and check out the spacecraft at Pad P-40;

4) Maintain and calibrate all MOL-HSQ Martin-supplied equipment;

5) Reduce data and perform data analysis on Laboratory; Transtage;

6) Prepare a MOL-HSQ final flight test report.

Task 7 - Facility Performance and Design Requirements - includes preparation of facility design criteria for MOL-HSQ-peculiar modifications to launch facilities. Surveillence of modification design and construction will also be provided.

D. RESPONSIBILITIES -- GOVERNMENT AND CONTRACTORS

The table below is based on the MOL-HSQ Statement of Work, SSD-CR-64-152, Revision 7, dated 12 August 1965:

Table II-2 Government and Contractor Responsibilities

	Contractor		Government and/or Other
	Martin	MAC	
Facility Design, Construction and Activation			
1. Facility Criteria and Concept and Interface Specification	R*	S†	S
2. Facility Design			R
3. Master Activation Plan	S	S	R
4. Master Activation Schedule	S	S	R
5. AGE Tearout (ETR)	R		S
6. Facility Modification and New Construction			R
7. Construction Surveillance	R		S
8. Facility Working Group	S	S	R
9. AGE Installation	R	S	S
10a. Subsystem Tests - Spacecraft		R	S
10b. Subsystem Tests - Simulated Lab	R		S
11. Integrated System Tests	R	S	S
12. Launch Complex Operations and Maintenance (O&M)	R		
13. Titan III Vehicle Equipment (AVE)/AGE O&M, and Logistic Support	R		S
14. Facility "As-Builts" (After BOD)	S	S	R

*R - Responsible Agency
†S - Support Agency.

Table II-2 (concl)

	Contractor		Government and/or Other
	Martin	MAC	
Launch Operations			
1. Detail Test Plan	R	S	S
2. Launch Test Directives	S	S	R
3. Ascent Trajectory Preparation	R	S	S
4. Re-entry Trajectory Preparation	S	R	
5. Guidance Equations			R
6. AVE Installation and Checkout (I&C)	R	S	S
7. Conduct Combined Systems Test (CST)	R	S	S
8. Propellant Loading	R	S	S
9. Launch Readiness Verification	R	S	S
10. Launch	R	S	S
11. Postflight Analysis (Quick Look)	S	S	R
12a. Data Acquisition (Up to Gemini Separation)	R		S
12b. Data Acquisition (After Gemini Separation)		R	S
13. Final Flight Test Report (Laboratory)	R	S	S
14. Final Flight Test Report (Gemini)	S	R	
15. Facility Refurbishment	R	S	
16. AGE Refurbishment	R	S	S
17. Facility O&M (Including RPIE Spares)	R	S	
18. AGE O&M	R	S	S
19. Interface Specification Maintenance	R	S	S
20. Complex Support	R	S	
21. Failure Analysis	R	R	S

III. INTEGRATION PLAN

Martin Company as Integrating Contractor for the MOL-HSQ Program will be responsible for integrating the several functions and responsibilities of Martin, MAC (Spacecraft Contractor), and DMJM (Architect-Engineer) into the MOL-HSQ Program.

On an overall basis, Martin will maintain cognizance of all HSQ system requirements and will identify system engineering problems to SSD/Aerospace Corporation as required.

A. INTERFACE SPECIFICATIONS

Martin, with MAC concurrence, will submit Appendix B to IFD-TIII-00001, Rev 1. This appendix, together with IFD-TIII-00001, Rev 1, will form the basis for preparing and maintaining all interface specifications between Martin and MAC. Martin, with concurrence of MAC and DMJM, will prepare an addendum to the Facility Contract End Item Specification, IFS-TIII-32000, in general accordance with AFSCM 375-1, Exhibit III, dated 1 June 1964. The Addendum to IFS-TIII-32000 will be maintained in accordance with IFD-TIII-00001, Rev 1, and associated Appendix B.

After coordination with MAC and DMJM, Martin will prepare the interface specifications referenced in Table II-1.

Periodically, throughout the program, Interface Control Working Group (ICWG) meetings will be held to assist in the identification, development, preparation, and maintenance of interface documents. Martin, as the custodial contractor, will establish, coordinate, schedule, and chair the ICWG meetings. Interface specification meetings (IFS) may also be held in the event of disagreement between contractors. These meetings will be convened at an appropriate time and location and chaired by SSD.

Following preparation of the interface specifications, Martin will obtain written concurrence from the affected associates and submit the specifications to SSD for approval.

As the program progresses, interface specifications may require revision. Martin, acting as custodian, will be directly responsible for the revisions. Changes to the IFSs may be generated by any of the associates or directed by SSD. These changes will take the form of Interface Change Notice Proposals (ICNP) and will be processed by the associates and customer in general accordance with IFD-TIII-00001, Rev 1, and Appendix B. Each ICNP, not originated by Martin will be sent to Martin for concurrence and formal submittal to the SSD Configuration Management Office (CMO). ICNPs originated by Martin will be coordinated with the affected contractor before formal submittal to the CMO. If there is disagreement between contractors involving an ICNP, an IFS meeting will be requested. Subsequent to the IFS meeting the agreed upon ICNP will be submitted by Martin to the SSD CMO with information copies to all affected agencies and associate contractors. Following CMO/CCB approval of an ICNP, SSD/NASA will issue the required contractual coverage and Martin will publish and distribute an Interface Change Notice (ICN) to each affected contractor and government agency.

B. FACILITIES

Martin, in conjunction with DMJM and MAC, will prepare facility design criteria and concepts to establish FAC/AGE/AVE interface relationships and requirements. Throughout the program, Martin will maintain technical liaison and coordinate requirements between MAC and DMJM. System facility requirements as developed with MAC and DMJM will be coordinated by MC with the appropriate government agencies.

Before and during the facility definition phase at ETR, Ground Systems Coordination Group (GSCG) meetings will be convened to define the facility criteria and design requirements and changes necessary for the MOL-HSQ Program. Martin will be represented at, and act as secretary for GSCG meetings. DMJM, MAC, SSD, Aerospace Corporation, and NASA will all be participating members of the GSCG.

Tradeoff studies to determine the optimum approach to facility implementation of MOL-HSQ requirements will be conducted by Martin and DMJM. The results of these studies will be reviewed by Martin for an integrated approach and incorporation into the FCEI specification.

Following award of facility design and construction contracts, Martin, as integrating contractor, will maintain overall surveillance; will assist SSD in identifying problem areas; will submit FCRs and FECPs to process changes; and will maintain the Addendum to IFS-TIII-32000 to a current status. In the event that an ICNP is required as a result of an FECP, Martin will assure its concurrent submittal.

C. AEROSPACE VEHICLE EQUIPMENT

To determine the compatibility of the spacecraft with the booster, the R&D test program, and ETR, Martin will conduct and integrate the following tasks:

1) Ascent trajectories, flight dynamics, separation dynamics, and guidance system studies for development of design characteristics and submittal of the nominal pretest ascent trajectory to ETR;

2) A combined systems test (CST) including electromagnetic compatibility (EMC) tests of combined booster, laboratory, and Gemini systems at launch pad (see Section V.A.3, Para 3, on EMC);

3) Analysis of changes required to launch checkout and countdown procedures as a result of Gemini requirements;

4) Range safety studies resulting in a range safety document required by ETR, incorporating Gemini range safety requirements;

5) Payload integrity studies required for Titan III R&D flights, including analyses of the complete orbiting vehicle and review and monitoring selected portions of the spacecraft test program. This effort will include the following:

   a) Review MAC-developed Gemini GT-2 reentry module structure and ordnance test programs;

   b) Review MAC ordnance circuitry design and drawings;

c) Review MAC-generated Gemini GT-2 environmental test programs for ordnance, parachute development, and attitude control propulsion components and subsystems;

d) Review the Gemini spacecraft EMI test results and history.

In addition, Martin will provide to MAC the necessary criteria, specifications and other applicable data including shock, vibration, and flight dynamic conditions to produce compatible designs. Martin will witness necessary tests and review test results to assure payload integrity. Anytime during these evaluations, Martin will advise SSD and MAC of any potential problem areas. Prior to flight, Martin will submit a letter of approval to SSD, if all problems have been resolved, stating that this payload should not prohibit the Titan III booster from successfully completing its R&D mission.

D. AEROSPACE GROUND EQUIPMENT

Martin, with inputs from MAC, will study the integration, installation, checkout, and operation of the Gemini AGE with Titan III AGE in the ITL. The results of this study will be defined in an Installation and Checkout Specification and required changes to end item specifications will be prepared and maintained by Martin. Accomplishing the installation and checkout of Gemini AGE will require subsequent contractual action.

E. LAUNCH OPERATIONS

Launch operations at ETR for the MOL-HSQ Program will be the responsibility of Martin. MAC will participate to the extent specified in a Joint Operating Agreement between Martin and MAC and coordinated with SSD/NASA. Generally, Martin will have the following integrating responsibilities:

1) Transport, erect, and check out the Simulated Laboratory in the vertical integration building (VIB) and integrate the checkout of the Gemini conical adaptor and reentry module at Launch Complex 40.

2) Act as test conductor at ETR;

3) Prepare a final flight test report on the Laboratory, using final data.

F. SUMMARY SCHEDULE AND COMMITMENT CALENDAR

As the MOL-HSQ Program progresses, certain commitments will be made between the various associate contractors that will directly or indirectly affect the performance of their respective contracts. These commitments will be tabulated on a Commitment Calendar, published, and distributed periodically by Martin to indicate interfacing agreements.

An example of the Calendar is shown in Fig. III-1. A summary schedule indicating the major milestones and span times for the overall program is shown in Fig. III-2.

PCC No.	Commitment Item	Responsibility for Action	Prime Recipient	Date Required		Reference	Actual Delivery Date		Remarks
				Prelim Item	Final Item		Prelim Item	Final Item	
6	Gemini Spacecraft **Deliver to P-40**	MAC	Martin	N/A	8/10/66	Page 9, Item 4 of 5-19-65 Tech Interchange Meeting Minutes & Program Master Schedule			
7	Input to SSLV/ Simulated Lab Interface Spec (IFS 61000)	MAC	Martin	N/A	6/25/65	CCN 1083 to Martin - 150 Contract			
8	Structural Load Data	Martin	MAC	6/11/65	8/1/65	Page 20, Item 11 of 5-19-65 Technical Interchange Meeting Minutes			

Fig. III-1 Sample Commitment Calendar

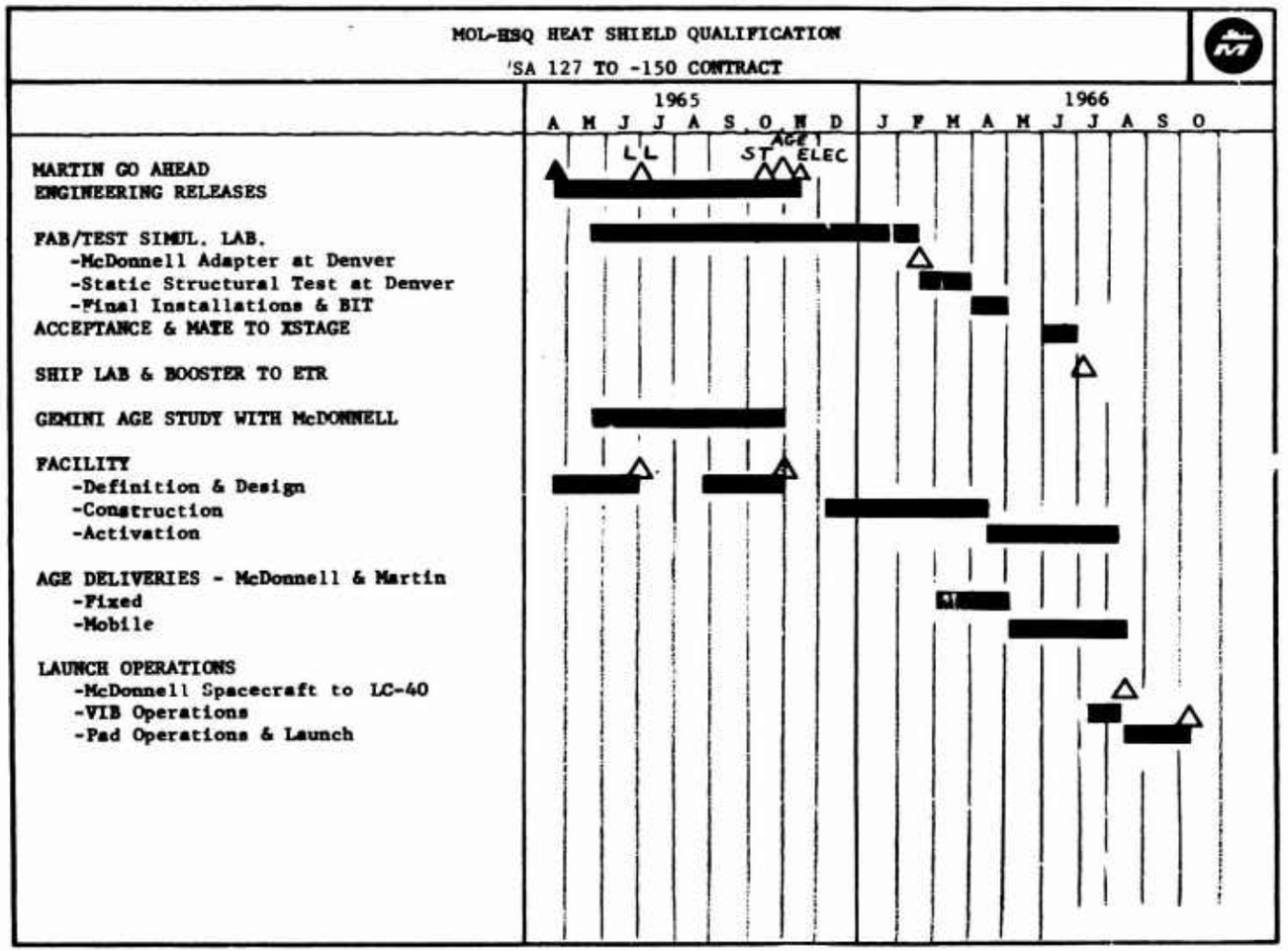


Fig. III-2 Summary Schedule

IV. MANAGEMENT PLAN

A. MARTIN ORGANIZATION

Martin programs are organized under the project concept. This concept provides the Program Manager relative autonomy in matters of technical direction, change control, schedule, and cost, and equips him with the personnel and resources necessary to achieve total program success. Strong, functionally oriented, central organization groups provide overall management policy guidance across projects, maintain a source of qualified personnel, ensure technical and management continuity, monitor and audit project performance, and provide common facilities, services, and support to the projects.

The MOL-HSQ program has been organized within the overall structure of the Titan III program. The MOL-HSQ Program Manager reports directly to the Titan III Program Director who in turn reports to the General Manager, Launch Vehicles. The MOL-HSQ program functions separately under the project concept and the MOL-HSQ Program Manager is responsible for direction and control of all aspects of the effort. Support from the Martin central organizations (Engineering, Materiel, etc) allows MOL-HSQ to take advantage of the experience and other resources from many Martin programs, including Titan III. In this connection, several specially selected Titan III personnel are assigned to the MOL-HSQ program, common use of certain functions is established, and the Titan III management control system is used to ensure a commonality of management purpose and approach.

The program personnel are responsible for management and control of all phases of a given program from inception to completion. The organization negotiates the contract, establishes program requirements and criteria, identifies and authorizes work to be performed, establishes direct budget and schedule requirements, monitors and reports program status and performance to management, and maintains prime customer liaison and contact on program matters. There is a check-and-balance relationship between program and central groups.

Central organization personnel are responsible for supporting the program organizations throughout all program phases. They set technical and professional standards, policies, methods, and guide-

lines with regard to their respective functions; they work closely with the program organizations in proper implementation of these items; and they ensure proper administration and operation of these items through periodic reviews and audits. Central organization personnel maintain customer contact and liaison on overall division items for which they have prime responsibility and support the program organizations by liaison with the customer on matters for which the program organizations have prime responsibility.

B. MODEL SHOP PRACTICES

For effective management an organization may employ a number of management and engineering controls. However, the controls may not be as extensive when the hardware to be built is one of a kind. Such is the case of the MOL-HSQ Simulated Laboratory and AGE peculiar to it. This equipment will be designed and fabricated using a model shop approach in accordance with Martin Company Standard Procedure 61.21, Shortrun Production of Special Equipment, and with Drawing Procedure 18A in the Drafting Procedures Manual.

1. General Approach

The usual approach of program controls at many levels of an organization is simplified in the MOL-HSQ model shop. There, in a centralized area, designers, fabricators, and support personnel work closely with resultant savings in time and dollars. Elements of the Simulated Laboratory and AGE peculiar to it will be designed and assembled in the model shop area. Support areas such as the detail fabrication shop, welding, X-ray, and paint facilities are close by. Simplicity and efficiency of operation depend on the personal responsibilities carried by a few well-placed individuals. This is the key to performance normally carried out by more formal procedures. Each team member must be constantly aware of the need to keep each of the others informed of his plans and actions. Such an organization is now established and functioning in the model shop area of the Martin-Denver factory (Fig. IV-1 and IV-2).

All work in the model shop will be done in accordance with released engineering, but the drawing system used will be a simplified one as described under Model Shop Engineering. The release and configuration management systems will also be simplified as described in the Configuration Management Plan. Initial release of these drawings will trigger manufacturing planning, tool design, material release, and the build actions. Manufacturing operations for the Simulated Laboratory will be written on short orders or

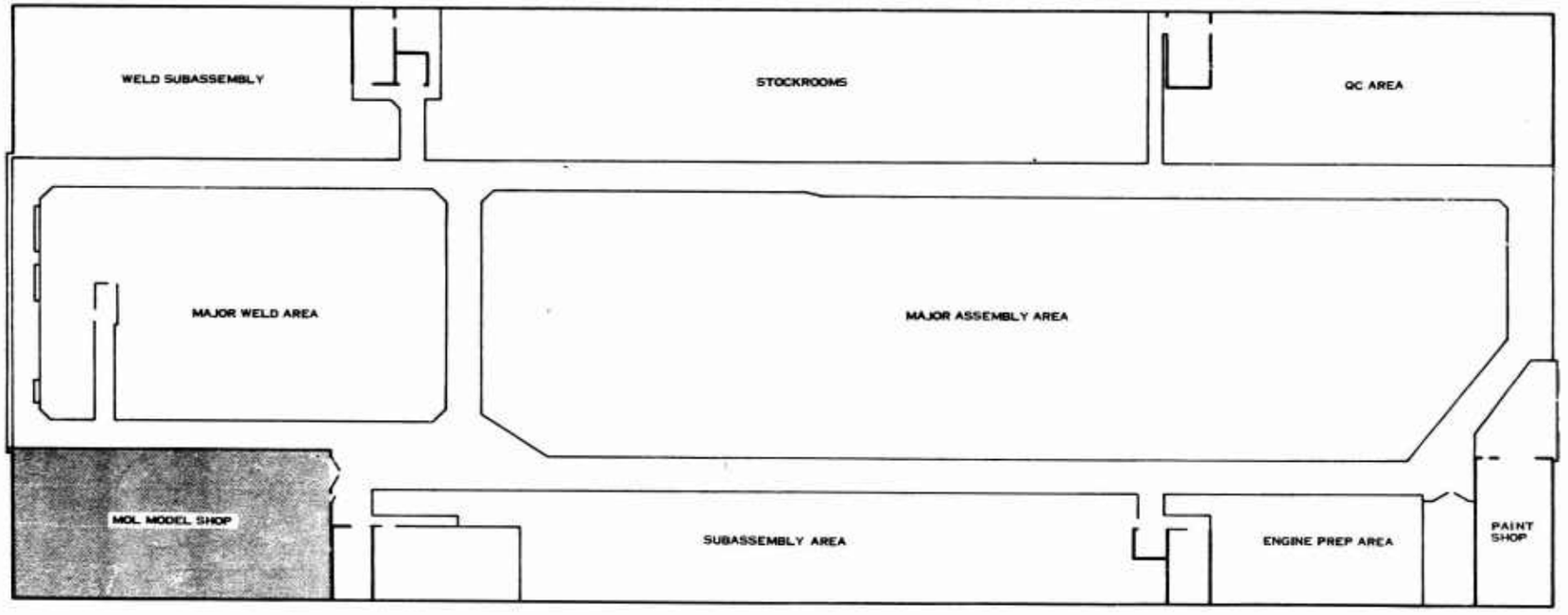


Fig. IV-1 Factory Second Floor with MDL Area

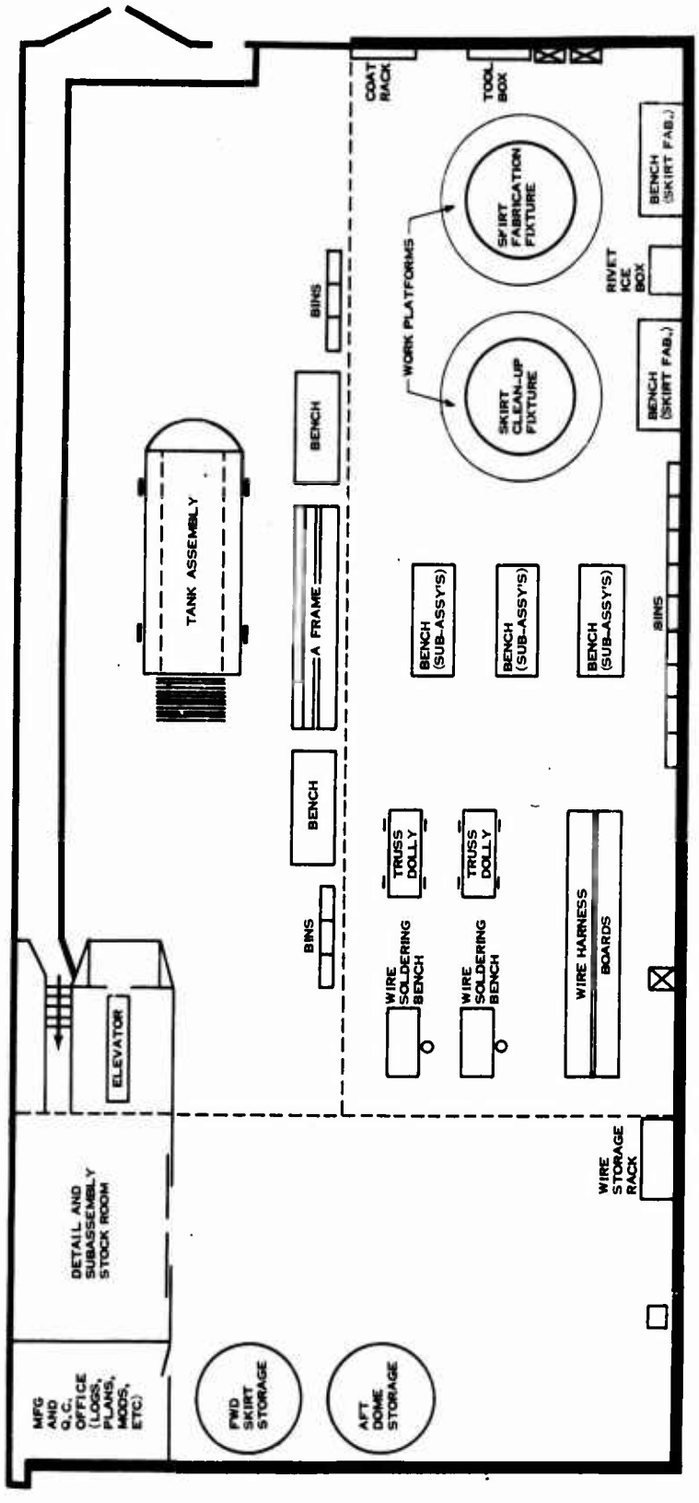


Fig. IV-2 Model Shop Layout

alternate process plans so that these orders can be routed directly to Production Control for initiation of shop folders especially identified for MOL-HSQ. Fabrication can then proceed using existing or soft tooling, by making shop aids, or by hand layout or location, whenever necessary.

The model shop will incorporate Quality Assurance to perform quality functions for assembly, checkout, and acceptance. This quality team will perform all inspections and documentation functions in preparation for Air Force acceptance of the completed Simulated Laboratory and support hardware, and will assist in ETR checkout and launch operations. Handwritten logs and process plans will be used for inspection documentation covering assembly and factory checkout operations. AFPRO Quality surveillance of the model shop operations and products is anticipated.

To solve problems uncovered in manufacturing or in test, the model shop approach provides for the actual designers to be available for on-the-spot answers, and for assuring formal engineering coverage within hours. Final configuration accounting will be by Quality DCN grid sheet against the engineering release Master Log. Assembly operations and installations per process plans will be available to the Air Force representatives to provide concurrent company-customer status. This procedure will also apply in developing the checkout tests for laboratory final acceptance tests.

2. Model Shop Engineering

A Class III drawing system will be used to support the MOL-HSQ model shop. This type of engineering, sometimes referred to as sketch engineering, conforms to good practices and gives adequate information for procurement and build. It is simplified in the sense that it bypasses certain formal requirements that are necessary when more agencies and more intricate lines of communication are involved than those needed for the model shop. The basic principles that will be followed are:

1) Maximum use will be made of descriptive notes wherever practical to eliminate pictorial work;

2) Drawings will be prepared in standard sizes and will show only the lines required to instruct the person who will fabricate the part(s). However, the part drawings will be reasonably proportional to the actual dimensions;

3) When convenient, details may be shown on assembly drawings rather than on lower level detail drawings;

4) The part number and quantity, or material requirements, may be placed adjacent to the part in the field of the drawing. Military specifications, and standards may be referenced for interpretation or direction;

5) Tolerances will be as liberal as part fabrication permits;

6) Wherever possible, parts will be ordered using existing procurement drawings or specifications as a call-out. If required, vendor part numbers may be used.

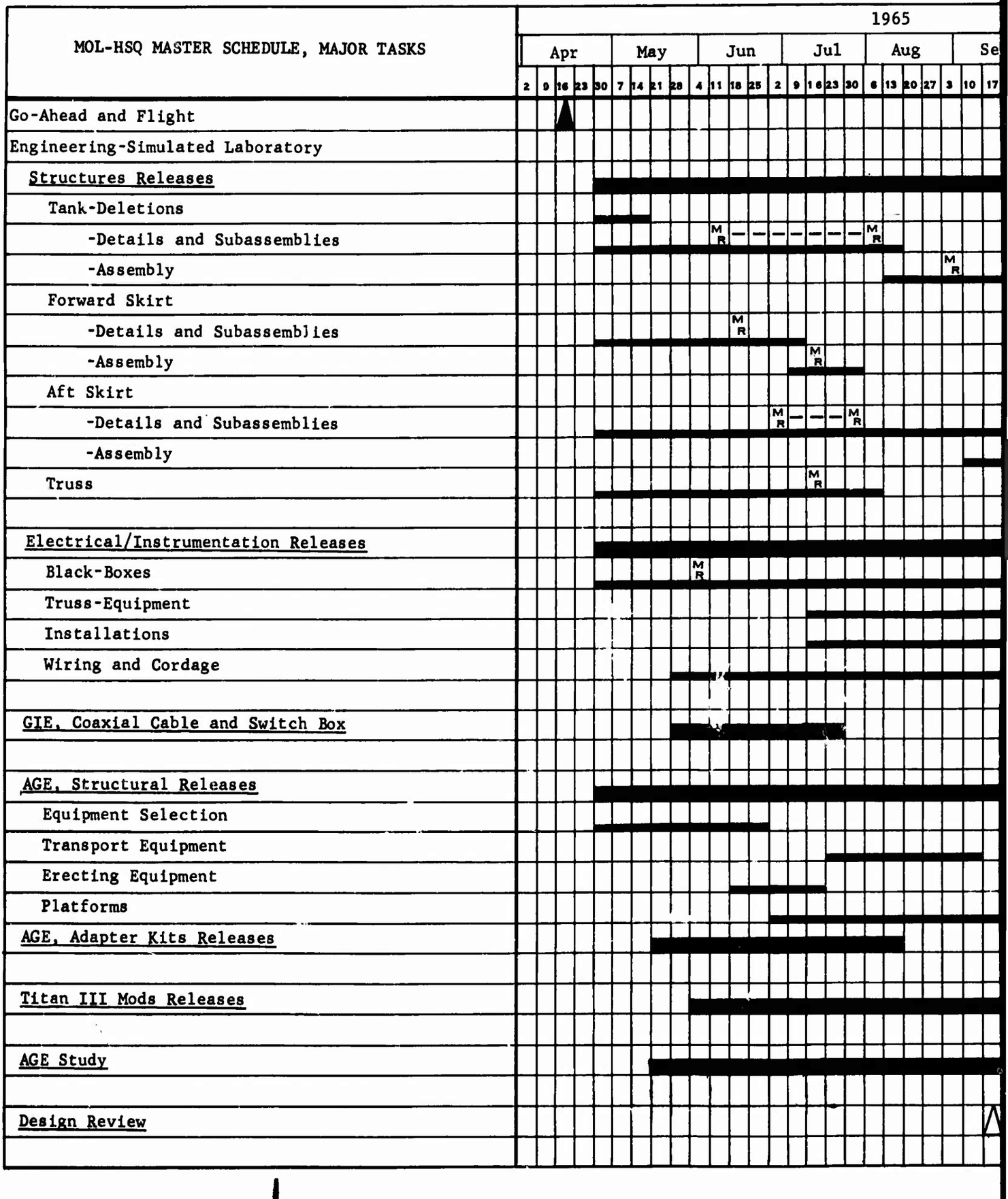
C. PROGRAM CONTROLS AND REPORTING

In addition to the model shop control, the following controls are required. These additional controls dovetail with the control structure of the Titan III program.

1. Work, Cost, and Schedule Control

Work is authorized entirely by company Operations Directive and by correlated functional department directives. These directives establish the task breakdown, work statements and schedules, and both Master Schedule (Fig. IV-3), and supporting Detail Schedules. Task budgets are established and published in Planning Tables. The PERT/Cost system, not normally used in a model shop, will be related to a small number of PERT/Time events to integrate MOL-EFT with the PERT/Cost reporting system of Titan III. Finally, daily comparison of operating information to the detailed working schedules provides cost and work status and will be used to identify deviations from the plan.

Such operating deviations are reported in the weekly project status report (the Green Book), to bring early management attention to program problems and ensure corrective action. As the weekly problem agenda for the Program Manager, such meetings consider the cost impact as well as the effect on overall program schedules.


MOL-HSQ MASTER SCHEDULE, MAJOR TASKS
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Engineering-Simulated Laboratory
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Tank-Deletions
-Details and Subassemblies
-Assembly
Forward Skirt
-Details and Subassemblies
-Assembly
Aft Skirt
-Details and Subassemblies
-Assembly
Truss
Electrical/Instrumentation Releases
Black-Boxes
Truss-Equipment
Installations
Wiring and Cordage
GIE, Coaxial Cable and Switch Box
AGE, Structural Releases
Equipment Selection
Transport Equipment
Erecting Equipment
Platforms
AGE, Adapter Kits Releases
Titan III Mods Releases
AGE Study
Design Review
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Note: See the Program Commitme detailed schedules on da deliveries, etc, between to support contract comm ule.

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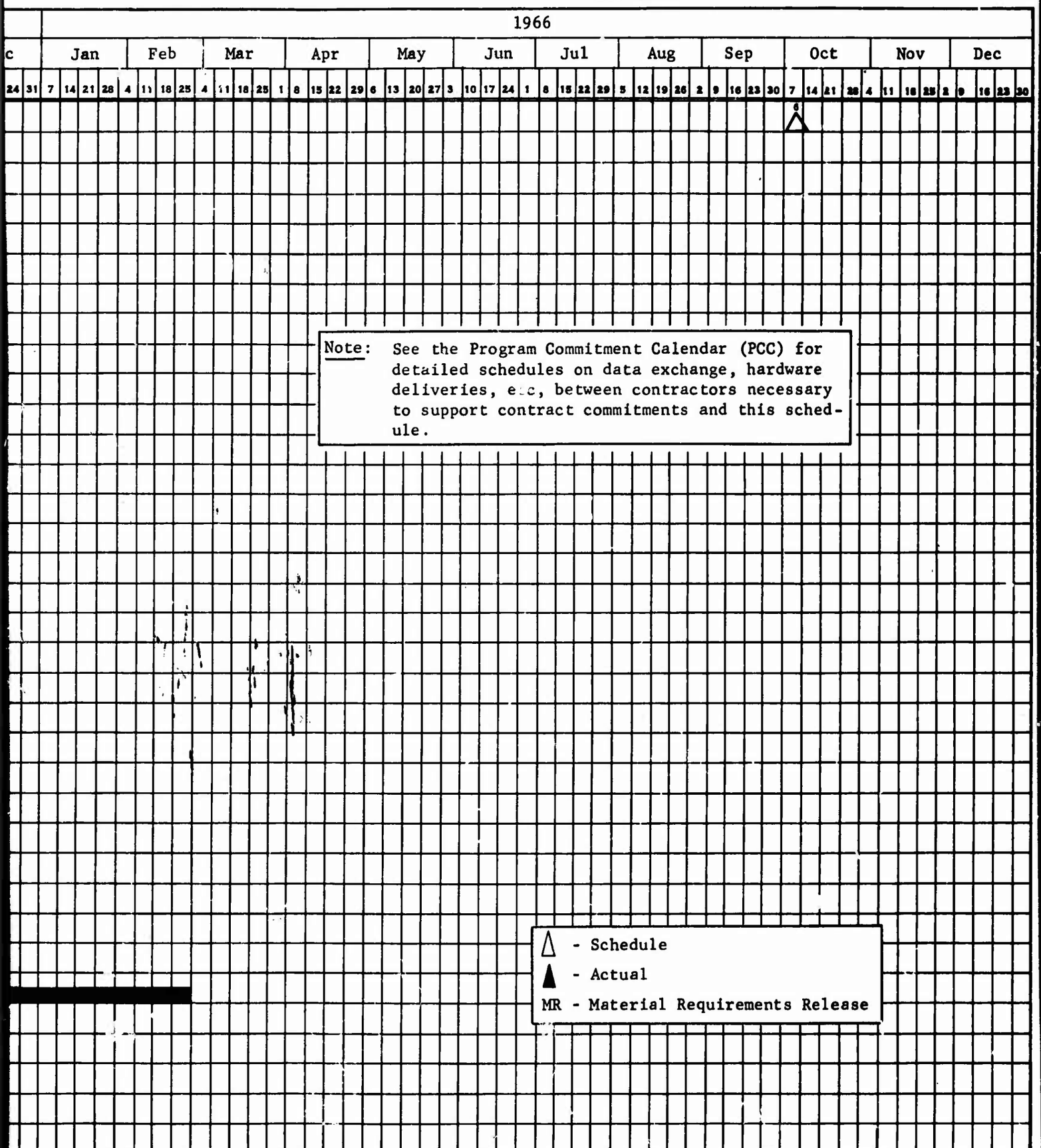

Revised 10/20/65 Fig. IV-3 MOL-HSQ Master Schedule

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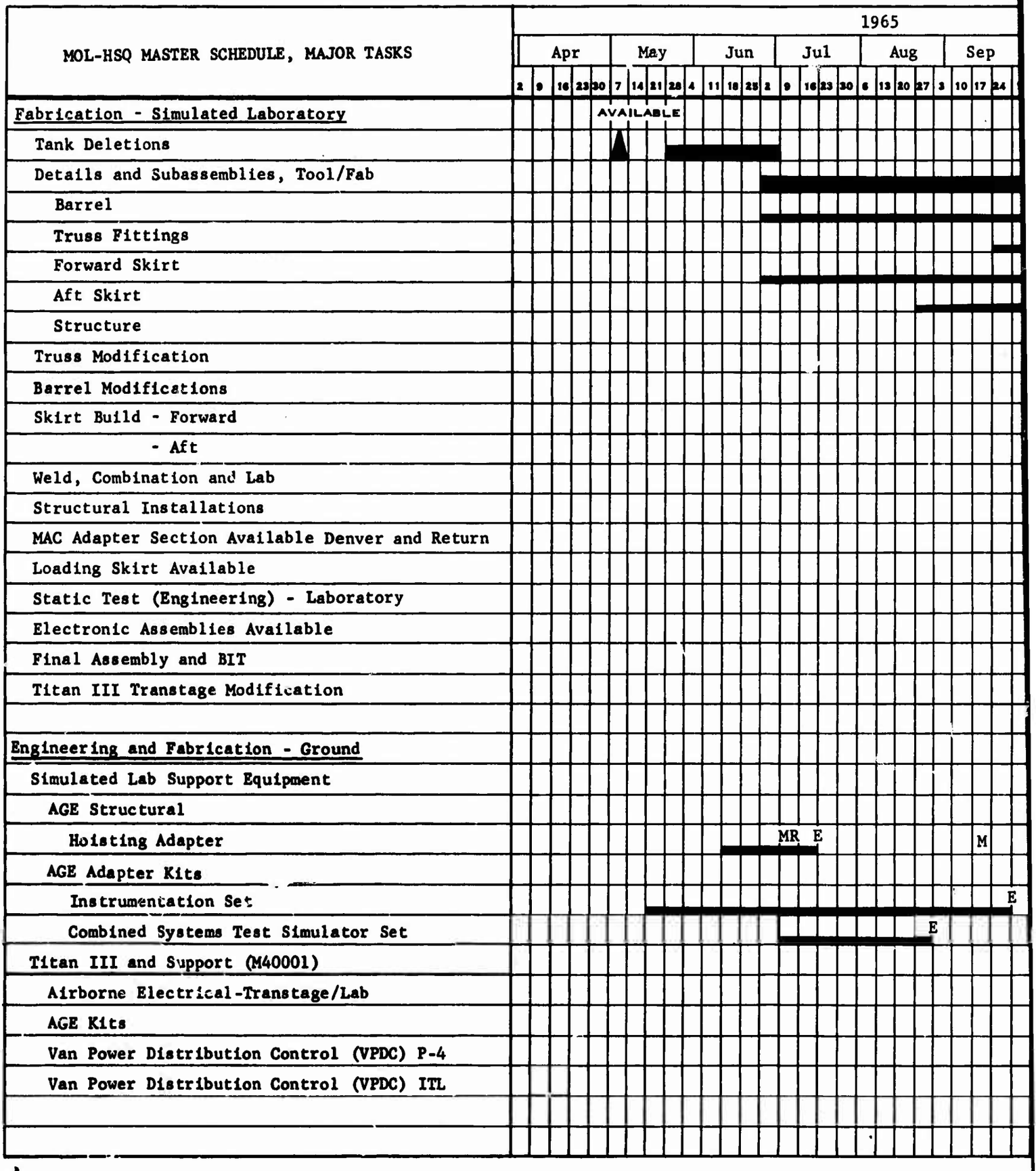
MOL-HSQ MASTER SCHEDULE, MAJOR TASKS
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Fabrication - Simulated Laboratory
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Aft Skirt
Structure
Truss Modification
Barrel Modifications
Skirt Build - Forward
- Aft
Weld, Combination and Lab
Structural Installations
MAC Adapter Section Available Denver and Return
Loading Skirt Available
Static Test (Engineering) - Laboratory
Electronic Assemblies Available
Final Assembly and BIT
Titan III Transtage Modification
Engineering and Fabrication - Ground
Simulated Lab Support Equipment
AGE Structural
Hoisting Adapter
MR E
M
AGE Adapter Kits
Instrumentation Set
E
Combined Systems Test Simulator Set
E
Titan III and Support (M40001)
Airborne Electrical-Transtage/Lab
AGE Kits
Van Power Distribution Control (VPDC) P-4
Van Power Distribution Control (VPDC) ITL

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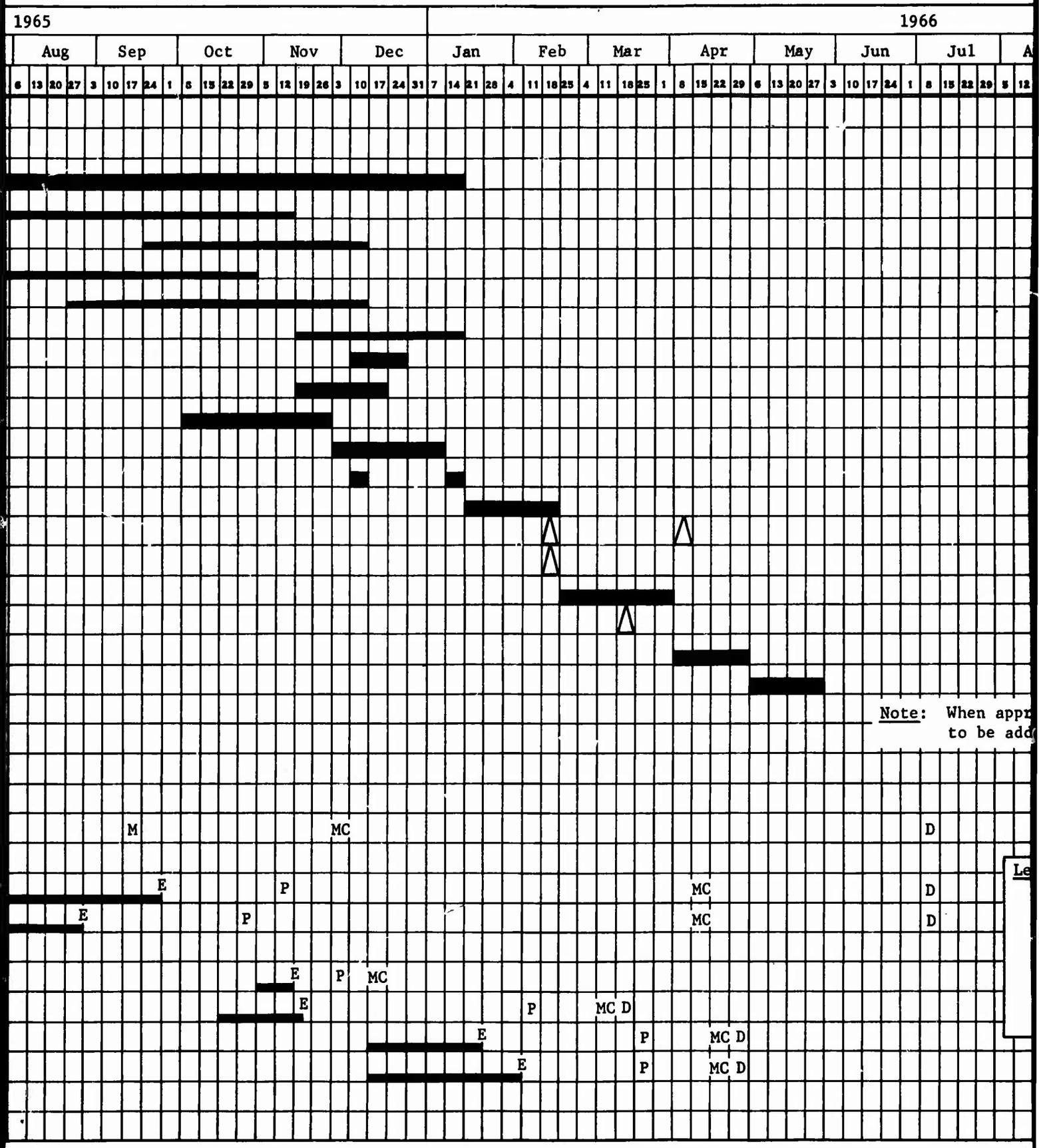
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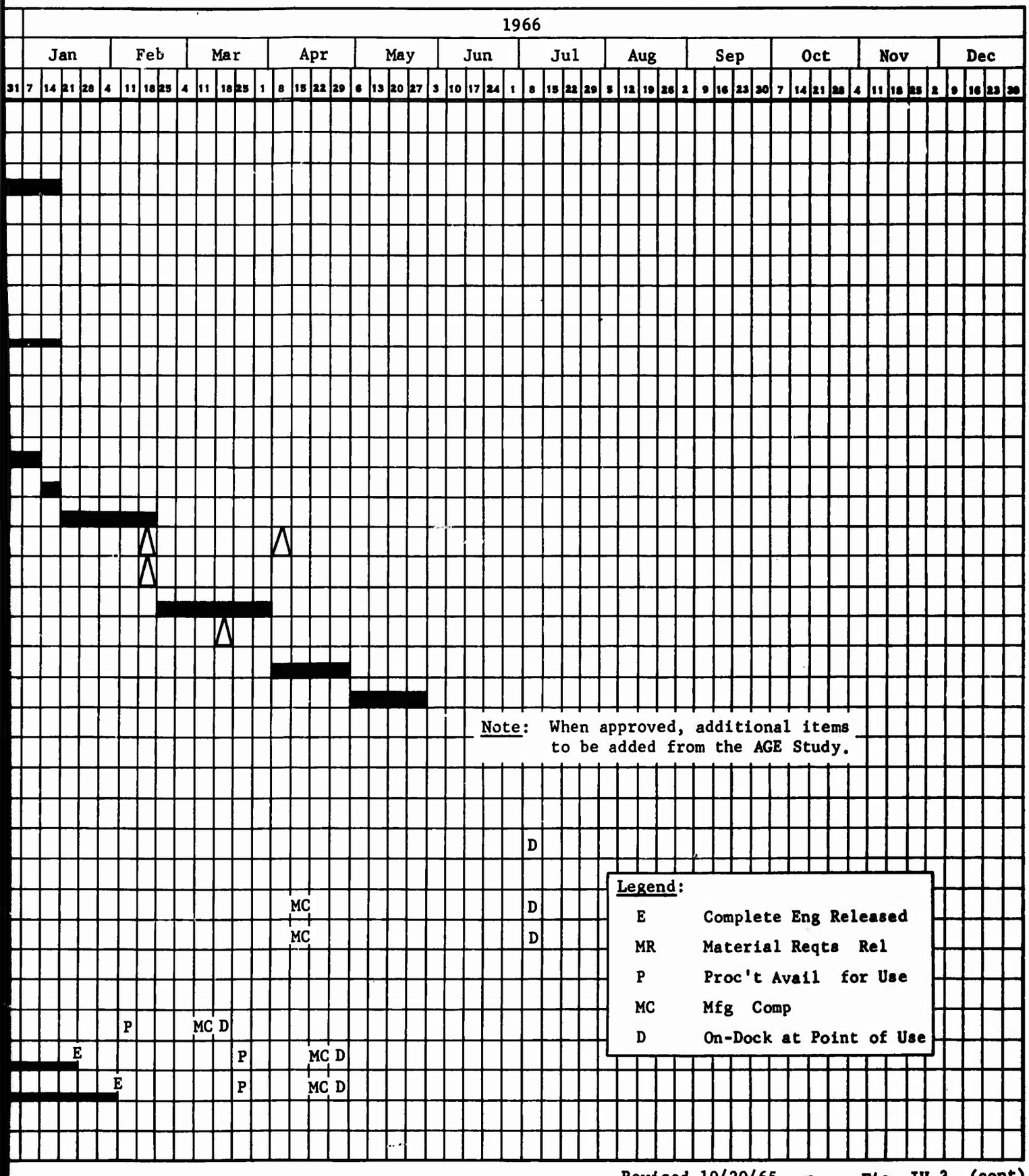

Revised 10/20/65 3 Fig. IV-3 (cont)

MOL-HSQ MASTER SCHEDULE, MAJOR TASKS	1965																														
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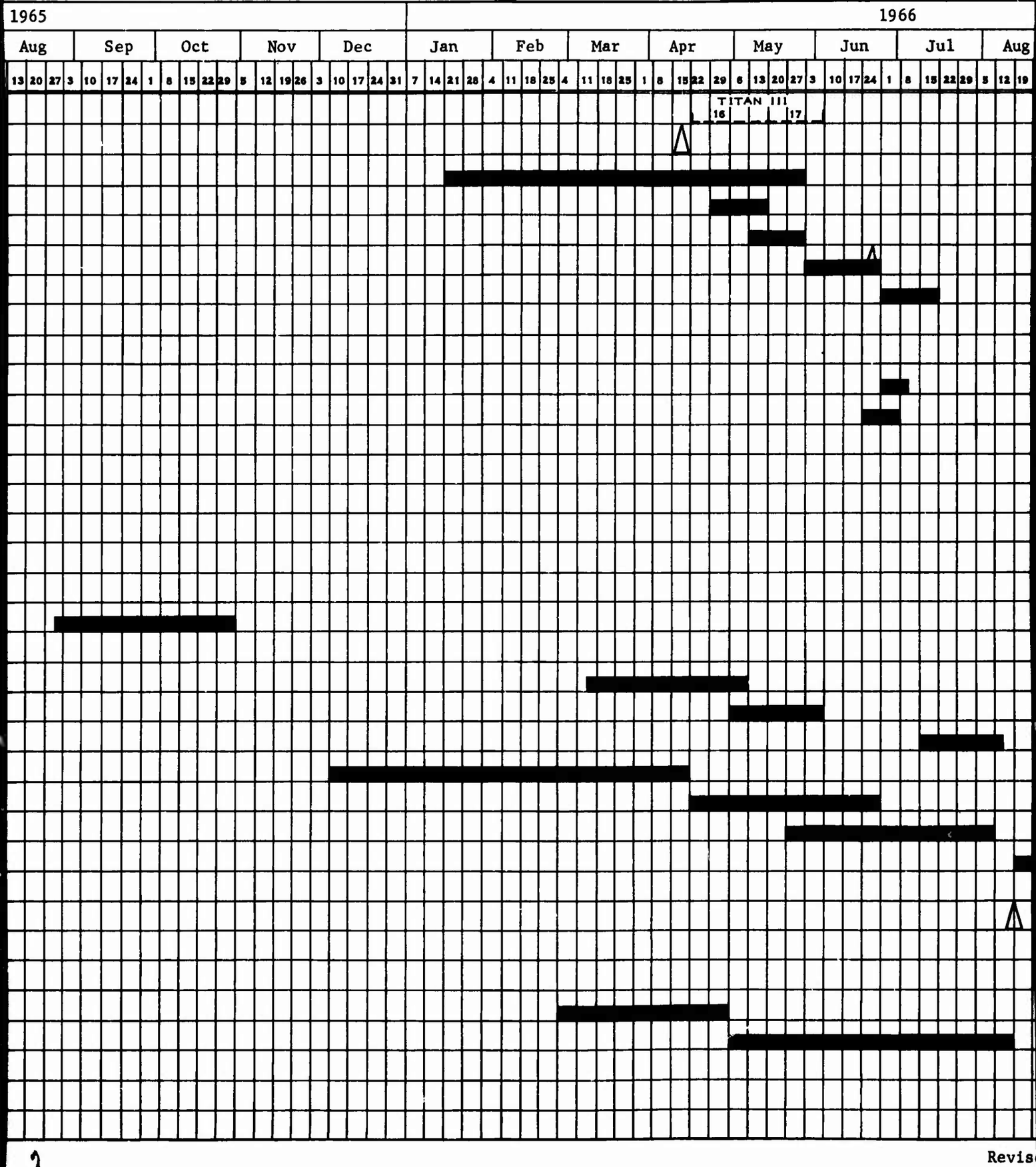
VTF - Cell P-4																															
Adapter Kits Available																															
Acceptance Procedures Preparation																															
Supports - Fabrication and Installation (Mfg)																															
Cell Mod																															
Test Operations - Lab and Transtage																															
Cell Restoration																															
Pack and Ship - Factory																															
Laboratory, Transtage, and Handling Equipment																															
Titan III - Stages I and II																															
ETR - Activation and Launch																															
Facility Criteria - Denver Engineering																															
- VIB Preliminary to SSD/A and Review																															
- P-40 Preliminary to SSD/A and Review																															
- Final to SSD/A																															
A&E Design																															
LCC and TRAN - Installations																															
- GSTPs/TPs																															
- Operations (SLV-9)																															
Pad 40 - Construction																															
- Installations																															
- Complex Checkout																															
- Operations (SLV-9)																															
MAC - Gemini Spacecraft to P-40																															
MAC - Martin AGE Deliveries to ETR																															
- Fixed AGE																															
- Mobile AGE																															
Final Report																															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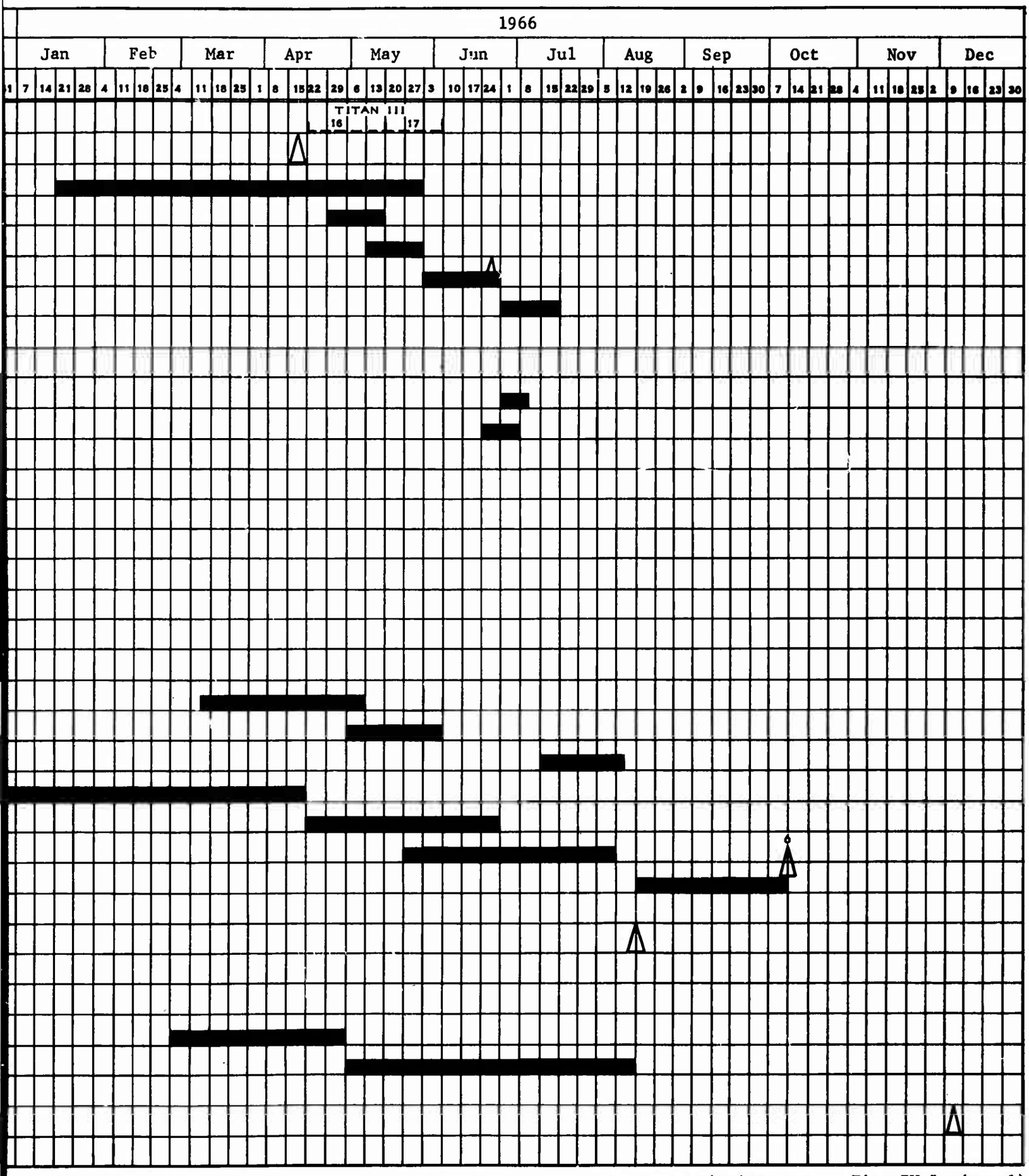

Revised 10/20/65 3 Fig. IV-3 (concl)

Actual cost data will be reported weekly to internal supervision for effective budget management at the working level. A customer report from this data will be included in the monthly Titan III PERT/Cost Activity Report.

2. Contractual Data Control

MOL-HSQ contractual data requirements added to SSS-TIII-010 DRD (Rev 3), dated 15 April 1965, by DSCNP-EF (Rev I) will be monitored by the MOL-HSQ Configuration and Data Management (C&DM) Program Manager with the support of Martin Company's Central C&DM Test and Documentation Section. Close project coordination achieved in the MOL-HSQ model shop operation will ensure timely contractual data submittals.

Internal page and line schedules will be developed under the MOL-HSQ C&DM Program Manager's guidance. These schedules will be consistent with the MOL-HSQ requirements in the DRD. Each step in data performance from writing through shipment will be scheduled. These schedules will be monitored throughout the program and will be modified to incorporate program-oriented changes. Schedules and performance data are made available to AFPR production personnel on a monthly basis.

Each item of data is subjected to a thorough inspection for both technical and contractual compliance by the Martin Data Management system. Once satisfied, the data item is presented to the local AFQC representative for acceptance, if no procurement officer approval is required. In case technical approval is required, Martin will present the data for contractual review by AFPRO, but AFPRO will withhold acceptance until approval has been received from the PCO.

When the contract is completed, Martin will compile a bibliographic summary of all contractual data items submitted during the entire MOL-HSQ program for contract closeout purposes. This report will list the title, requirement number from the contract, report number, acceptance document number, shipper or transmittal letter number, and the date shipped.

D. CONFIGURATION MANAGEMENT PLAN

The MOL-HSQ Program is divided into two segments: those items that are peculiar to MOL and those items related to Titan III.

Simulated MOL and MOL-HSQ-Peculiar Aerospace Ground Equipment - The special Configuration Management techniques defined in this plan are established for a small program with limited quantities, and are based on the tight integration of the Engineering, Manufacturing, Program Control, Quality, and Procurement functions.

Titan III Aerospace Ground Equipment and Airborne Vehicle Equipment - Modification of the Titan III Contract End Items (CEI) will be accomplished in accordance with Titan III procedures unless otherwise specified in the Configuration Management Plan.
PPCN-1 The technique of establishing a properly configured modification kit to modify operational hardware for limited operational usage has been established to minimize costs while maintaining configuration control. The MOL-HSQ modification of a Titan III CEI, establishes a MOL-HSQ CEI until the modification is removed at the conclusion of the program.

1. Applicable Documents

The following documents are applicable for Configuration Management for MOL-HSQ to the extent specified here: SSD-CR-63-11 (Rev 1), and IFS-TIII-00001 (Rev 1) and Appendix B.

2. Model Shop Configuration Management

Configuration management of the design, build, and acceptance of MOL-HSQ-peculiar equipment will be accomplished using the techPPCN-1 niques defined here. All engineering is to be Class III engineering as defined under Model Shop Practices. These special techniques will be augmented by portions of the Titan III Configuration Management system as defined here when hardware and as-built drawings are shipped to ETR.

1) MOL-HSQ Project Engineering will establish a release system to authorize and control the engineering configuration requirements of all end items -

   - The basic drawings to be used in this system will be identified by an SK808DXXXXX numbering system.

This page incorporates PPCN 1.

- A manually maintained Master Log will provide total accountability for all released drawings and changes.

- When the Project Engineering and Manufacturing representatives have signed a basic drawing or Drawing Change Notice (DCN), MOL-HSQ release then makes an entry in the Master Log and releases the engineering for implementation.

- DCNs will be incorporated into the drawings at the convenience of the Project Engineer. The number of unincorporated DCNs will be minimal at time of shipment to ETR.

- Should a drawing be cancelled, the Master Log will show the cancellation, but shall maintain the record of the cancelled drawing and its DCNs.

- For MOL-HSQ-peculiar equipment, only changes that require SCNPs or affect hardware or test after COC delivery will use the Uniform Control Number (UCN), the Job Unit Release Sheet (JURS), the Progress
PPCN-1 Ticket (PT), and the Change Operations Directive (COD). Before acceptance these releases will be posted on the Configuration Identification Index (CII) tab run only.

2) Manufacturing indicates the proper buy requirements to Procurement, and schedules the implementation of the engineering.

3) Quality performs inspections based on the engineering requirements listed in the Master Log and prepares the necessary Quality Log books showing work acceptance -

   - At time of acceptance Quality will assemble all required documentation, assure accountability of all released engineering, prepare a Certification of Completion (COC), and present this and the hardware for acceptance by AFPRO per AFPRO procedures.

4) After COC, acceptance of engineering releases will be accomplished as follows -

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This page incorporates PPCN 1.

- When the need for a change is recognized, the engineer will define the total change requirement in PT increments.
- On release of COD approval, Engineering may release the PTs.
- These releases shall be posted on the CII tab run and on the retrofit tab run.
- When ETR or Denver obtains the retrofit tab run requirement, the COD, and the necessary kit, the change is installed and closed out using the retrofit tab run system. The engineering Master Log will reflect the retrofit tab run closeouts.

5) A complete set of as-built drawings shall be submitted at the completion of this program.

PPCN-1 6) All changes to MOL-HSQ-peculiar hardware that affect the governing contractual specification will be submitted to SSD as an SCNP to the applicable MOL-HSQ hardware specification in accordance with standard Titan III procedures.

PPCN-1 7) All MOL-HSQ-peculiar hardware and changes thereto are nondeliverable.

3. Modifications of Titan III CEIs to Support MOL-HSQ

Due to the limited use of the modification to a Titan III CEI, a new drawing designator (808D series) was created. With this drawing designator, the modification can be precisely identified and then removed at program completion.

PPCN-1 All modifications of Titan III CEIs will meet standard Titan III procedures unless otherwise specified in this Configuration Management Plan.

1) An 808D series top drawing will be established for each Titan III CEI to be modified to show -

- The method of installing, testing, and identifying the modification.
- The method of removing the modification, retesting, and reidentifying the Titan III CEI.

This page incorporates PPCN 1.

2) In accordance with SSD-CR-63-11 (Rev 1), and as the master schedule requires, a COD will be prepared for each basic engineering release and each subsequent change.

3) The DD Form 829-1 will be updated to record the modification by UCN, its purpose, and the new CEI part number. It will be updated again when the modification is removed.

4) The Titan III CEI serial number will not be changed as a result of these modifications.

PPCN-1 5) Airborne vehicle equipment modifications will be expended, therefore no removal of modifications is possible or required.

6) None of the 808D series of drawings will appear in the Titan III CEI engineering drawings or drawing indentures.

7) COC acceptance of a modification will take p'ace at the completion of the installation and testing of the modification.

PPCN-1 8) All modifications to Titan III CEIs will be nondeliverable.

PPCN-1 4. Specifications

PPCN-1 1) MOL-HSQ-peculiar hardware is defined in MOL-HSQ Research and Development Specifications. Changes to MOL-HSQ-peculiar hardware specifications shall be processed in accordance with Para 2.6).

PPCN-1 2) MOL-HSQ modifications to Titan III AVE and AGE have been defined in addenda to Titan III R&D Specifications and approved at contract go-ahead. Future changes to Titan III hardware after baseline will require EPCs in accordance with standard Titan III change procedures and an SCNP to update the MOL-HSQ addenda to Titan III AVE or AGE.

PPCN-1 3) An addendum to the Titan III AMR I&C Specification will define the Martin Company-supplied new installations required for the MOL-HSQ program.

This page incorporates PPCN 1.

PPCN-1 4) A MOL-HSQ Installation and Checkout Specification will define the I&C requirements for MAC supplied AGE. Class I changes to these requirements will be controlled by SCNP action to the I&C Specification.

PPCN-1 5) Research and Development specifications maintenance will be accomplished in accordance with SSD-CR-63-11, Rev 1, Para 5.4.1 through and including 5.4.1.4.

PPCN-1 6) Interface specification preparation and maintenance will be accomplished in accordance with Appendix B to IFD-TIII-00001, Rev 1.

5. Definitions

PPCN-1 1) Deleted.

PPCN-1 2) Deleted.

3) The Uniform Control Number (UCN) is a number assigned to Class I and Class II Critical Engineering Design Change Schedules. Further, the UCN is used to identify all documents associated with implementing that change.

4) Progress Ticket (PT) is an incremental breakdown within engineering to provide the capability of partial UCN release.

5) Job Unit Release Sheet (JURS) is used to collect and list all drawing(s) and DCN(s) for one PT.

E. TECHNICAL MANAGEMENT

1. Engineering

All engineering required to fulfill Martin Company's responsibilities on this program is under the cognizance of a single MOL-HSQ Project Engineer. This program contains a threefold responsibility: Simulated Laboratory, Titan III modifications, and technical integration. Engineering effort in all three areas is directed and controlled by the MOL-HSQ Project Engineer using engineering directives, engineering schedules, engineering time and cost reports, and direct personal supervision.

This page incorporates PPCN 1.

Hardware for the Simulated Laboratory and its peculiar AGE will be designed by the Model Shop Engineering Group. Hardware for Titan III modifications will be designed by engineering personnel regularly assigned to Titan III, in accordance with established Titan III procedures, but subject to direction and control of the MOL-HSQ Project Engineer. Certain analyses and support efforts which require unique Titan III knowledge or involve engineering specialties that are best provided from a central support group will be performed by appropriately qualified people outside of the Model Shop Engineering Group under the direction and control of the MOL-HSQ Project Engineer.

Systems Engineering Management - This approach provides an integrated regulation of detailed design, test, and analysis that will be applied to the various modification and deviation requirements that arise as the program progresses. Systems Engineering Management techniques that will be applied to the MOL-HSQ program are:

1) Specification Review - The detailed subsystem technical requirements portions of the various contractual specifications are prepared by the basic design groups. Systems Engineering reviews these specifications for system interface compatibility, adherence to total system concept, and compliance with program objectives and contractual intent.

2) Criteria Development - This is a single top noncontractual document prepared by Systems Engineering to supplement the contractual specifications. The criteria document contains such items as -

   - Design approach - developed as a result of logical extension of Titan III design consistent with spacecraft requirements.
   - Test configuration - including detailed requirements for test tools, simulators, and test instrumentation.
   - Criteria for success - detailed instructions for interpreting test results.

3) Compatibility Analyses - This is a continuing review of the various elements of the total system as design evolves to assure functional compatibility and compliance with criteria and specifications.

4) Design Reviews - Systems Engineering is responsible for obtaining competent engineers not directly associated with the MOL-HSQ Program to perform design reviews. This will bring total Martin engineering experience to bear on the program to assure sound design concepts and avoid repetition of previous errors.

5) Test Program Direction - All requests for special tests and/or instrumentation are processed through Systems Engineering test planning and evaluation for integration and technical direction to field test crews.

2. Manufacturing and Quality

The basic concept revolves around the model shop approach that the MOL program will be a separate company project. A Manufacturing Project Manager will be assigned, and line Manufacturing organizations will be responsible to him. Support organizations that have a direct impact on the manufacturing effort will receive work and schedule direction from this Manager, but they will report to their parent organization for administrative direction. The Manufacturing Project Manager will exercise control and responsibility for the entire build effort, from the planning and detail stages through the final build and floor testing.

Each of the Manufacturing Departments will assign key personnel to the Manufacturing Project Manager, as required. The Project Manager will monitor and control the allocation of manpower and materials in accordance with the master build schedule.

The Manufacturing Engineering Department will be responsible for the planning and tooling for this program. The planning effort will start before the initial engineering releases and will parallel the design engineering effort throughout the program. The planner will establish master build plans and control numbers to identify the sequence of work. All plans will be written as alternate process plans and will be directly routed to Production Control for initiation of MOL-HSQ identified shop folders.

Parts Requirements of Production Control receives sketch-type engineering and creates a Parts Requirement Form that denotes material requirements and units of measure. This form is then forwarded to Materiel. A parts list is issued to Order Writing, denoting assembly and detail fabrication effort.

Order Release receives the parts list and issues shop orders and obtains process plans for Tooling. The shop order is checked by Product Cost for correct work order, by Industrial Engineering for goal hours, and is routed to IBM so that its physical location in the fabrication shop can be determined at any given time. The order is routed to Stores for issuance of raw material, and then to the fabrication area. Each shop order will be identified by a green and yellow folder with MOL printed on it.

The Rework Group will process all change records created as a result of engineering changes. The change record denotes action required in accordance with drawing change.

Any changes to detail plans or assembly plans (logs) will be made on the job with Quality Control present. Any modification planning will be limited to minimal modification instructions.

Production Control will be responsible for the detailed scheduling and statusing of the entire manufacturing effort, and will be the policing organization for controlling schedule problems and delinquent efforts.

Quality will assign a single point contact Project Representative to the MOL-HSQ Program who will be responsible for overall direction and control of the Quality effort and for effective fulfillment of the program requirements. This representative will:

1) Direct and coordinate inspection requirements and skills required for the model shop planning, build, checkout, and acceptance operations.

2) Allocate Quality manpower assignments and cost consistent with the program requirements and budget.

3) Establish and maintain continuous liaison with the Customer representatives and minimize problems relating to Quality activities and hardware status.

4) Coordinate with the MOL Project Team for the investigation of problems and initiate follow-up action to resolve discrepancies.

5) Participate in MOL-HSQ Policy, management, and operations meetings as representative for the Quality Director.

Quality skills will be drawn from the labor pools existing in the areas where specialty operations are being performed, such as welding, X-ray, or laboratory services. Where assembly operations are being carried out, the most qualified personnel will be assigned on the job. If a task requires certified skills, such personnel will be drawn from the existing forces to complete the specific task.

Final payload testing for customer acceptance will require specialized crews. Personnel with these skills will be alerted to participate in the testing.

Quality will ensure complete and comprehensive documentation of build, test, and configuration data required to achieve customer acceptance of all program hardware.

3. Test

The Systems Test and Support Department is responsible for modifying Vertical Test Fixture (VTF) Cell P-4; preparing procedures for and performing the Simulated Laboratory acceptance tests and checkout of the Laboratory before launch at ETR. So that continuity of effort and close control can be maintained, a Test Department Project Representative and a small number of key individuals will be responsible for all phases of the operational program from planning through the checkout of the laboratory at ETR. Additional help will be obtained on an as-needed basis to meet peak work loads.

4. Canaveral

Canaveral will appoint a Payload Product Manager for MOL-HSQ, and he will have total Canaveral management authority to commit and control division effort, budgets, and contractual compliance. The Payload Product Manager will report to the Director of Titan III Operations (Canaveral) and will be responsible to the MOL-HSQ Program Manager at Denver.

V. TECHNICAL PLAN

The technical requirements for this program are defined in the Statement of Work (SSD-CR-64-152, Rev 7), and in appropriate end-item specifications. The Technical Plan describes how Martin intends to fulfill these requirements.

A. ENGINEERING

For purposes of the Technical Plan, engineering is defined as studies, analyses, design, test planning, and evaluation. The broader aspects of engineering, normally referred to as systems engineering, are an integral part of integration and technical management and are so treated in this program plan.

1. Studies and Analyses

Trajectory Shaping - Based on requirements established by SSD governing reentry parameters, impact area instrumentation, and other range support requirements, as well as upon aerodynamic, structural, and staging constraints established by Gemini and Titan III designs, computer studies will be conducted to determine the optimum ascent trajectory for the HSQ flight. The data will be coordinated with AC Electronics, who provide the flight guidance program and tape.

Flight Controls Analysis - Standard Titan III procedures require routine stability analyses of the flight controls system whenever a significantly different payload/trajectory configuration is established. These analyses establish and verify system parameters, such as phase and gain margins, and gain change times and factors. The analyses result in detailed requirements for design of the adapter programer for that particular flight. In the case of the MOL-HSQ configuration, Pre-Phase I analyses indicated a potential instability during Stage II flight. The analyses to be conducted will concentrate on confirmation of Stage II requirements to satisfy the stability criteria.

Pogo Analysis - Pogo refers to a longitudinal oscillation phenomenon inherent to liquid rocket systems. Instabilities may arise due to potential coupling of naturally oscillating system elements. Drawing upon past engineering experiences, Martin, using an established Titan III/payload flight vehicle mathematical model, analyzes this phenomenon as critical parameters become known through design. Parameters are adjusted, or fixes proposed as necessary, to assure acceptable stability margins.

Aerodynamic Analysis - Martin will perform structural heating studies for stress and environmental analysis and review the airloads data generated in previous studies and update the data as required.

Range Safety Studies - An addendum to Program 624A Range Safety Data, Configuration C, SSD-CR-65-32, will be prepared by Martin for review by SSD and transmittal to ETR.

The current data, with respect to basic Titan III configuration, sequences, performance constants, error analyses, and failure modes is expected to remain essentially unchanged. Pertinent data for the Simulated Laboratory and the Gemini will be added. The most significant change will have to do with the actual trajectory shaping. Since the trajectory data currently contained in the document consider an orbital injection requirement, it will be necessary to develop new nominal, minimum, and maximum trajectories based on a planned reentry, as well as additional dispersion studies based on the MOL-HSQ payload.

Staging Analysis - The staging dynamics associated with the booster will be reexamined for effects of MOL-HSQ configuration. Any anamolies discovered will be identified to Titan-III for correction.

A separate study of the dynamics of separation of the Gemini module from the Simulated Laboratory will confirm the clearances involved, and will evaluate the effects of residual rates at separation. After identification of final staging criteria by SSD/Aerospace, Martin will define requirements for supplemental propulsion forces or special maneuvers to ensure that a clean separation occurs and is maintained through reentry. Development of any special separation devices or maneuvers are not in the current statement of work and thus, are not in this plan.

Stress Analysis - Although the Simulated Laboratory design loads have already been established, loads data will be monitored during the detail design phase. To verify that the design is sufficient to maintain the required loads with the proper safety factor, detail stress analysis will be conducted during the design phase. Stress analysis coverage will be supplied during the structural testing.

Weights Analysis - Mass property data will be calculated from pre- and post-released airborne engineering drawings as they become available. Before the Simulated Laboratory is shipped from the factory to the site, it will be weighed to determine its weight and center of gravity location. This actual weight and center of gravity determination combined with adjusted ballast location will assure that the program requirements for mass properties have been satisfied. A Weight and Mass Properties Control Plan is attached as Appendix A.

The Transtage will be weighed by the Titan III Weights Group before shipment to the site. The Gemini Reentry Module and conical adapter will be weighed by MAC in its final airborne configuration before it is shipped to the launch site.

Reliability Analysis - The Reliability Analysis to be conducted in support of the MOL-HSQ program will be restricted to the following:

1) There will be an initial reliability review of the interfaces between Titan III and the MOL-HSQ payload to evaluate critical areas tending to lower the probability of achieving all flight objectives. Outputs of this review affecting Simulated Laboratory elements will be worked-off between the Reliability Unit and the HSQ designers. Outputs of this review affecting Gemini will be worked-off between Martin and MAC. Subsequent changes to these interface areas will be reviewed as they occur.

2) Actual component or system failures will be reported on Martin Company reporting forms submitted directly to the Reliability Unit. There they will be manually processed and evaluated and corrective actions recommended. There will be no machine processing of reliability data for the MOL-HSQ program.

Venting Analysis - A venting analysis will be performed on the Simulated Laboratory, aft of the forward dome and the skirt volumes, in conjunction with the Titan III Transtage. Results of this study will define the orifice size for the aft dome of the Simulated Laboratory to avoid collapsing pressure on the main tank section and will define differential pressures across aft dome and aft skirt skin for purposes of structural design.

Final Loads Analysis - Design loads for the Simulated Laboratory structure will be based on Configuration 32 of the MOL* constraints report, but a final loads analysis will be performed before flight for verification of safe flight load limits. Load analyses will be performed on Titan III/MOL-HSQ vehicle with the following conditions:

1) Flight loads due to wind shear for various azimuths and altitudes. This analysis will use nominal trajectory and vehicle parameters. Dispersion load analysis will be based on existing Titan III dispersion analysis.

2) Gust analysis for maximum gust and maximum airload conditions.

3) Buffet analysis for maximum buffet and maximum airload conditions.

4) Combination of above loads using the philosophy developed for Titan III Program. (Ref Titan III Load Report)

*MOL Titan III Pre-Phase I Study. SSD-TR-64-207 (Vol III-2), Martin Company, Denver, Colorado, September 1964. (Unclassified)

Environmental Analysis - Environmental criteria covering such areas as shock, vibration, acoustic levels, flight pressure and temperature, etc, are defined for the Simulated Laboratory in Specification MOL-HSQ AVE-1000. Additional analyses will be performed to assist designers in mounting equipment and assuring adequate margin with respect to specified qualification environmental values for the various components.

Martin will also prepare, based on the criteria and Titan III predicted and measured values, environmental criteria for the interface between the Simulated Laboratory and the Gemini Spacecraft. These will be published in the interface specification between Martin and MAC, and will be used in evaluating McDonnell design, test criteria, and test results as required to satisfy Martin responsibility for payload integrity. These data will also be used in the structural design and to establish measurement ranges in the instrumentation system.

AGE Compatibility Study - The purpose of this study is to review the requirements for integration of the Gemini AGE into the launch complex. The basic ground rules to be followed in the integration process and identification of changes are:

Assure that Gemini AGE does not duplicate services or functions available at ITL.

Assure that Gemini AGE can be properly supported by the ITL systems.

Assure that Gemini AGE can be integrated physically, operationally, and sequentially into the ITL.

The method of conducting the study will be:

1) Exchange data with MAC through Interface Working Group Meetings (documented in signed minutes reflecting agreements and action items) and through written and signed Data Transmittals (including signed TWXs and telephone conversations confirmed in writing).

2) Evaluate Data in consonance with the above stated ground rules and perform informal tradeoff studies as required.

3) Define AGE new build modification, and installation requirements.

There will be several outputs of this study:

An installation and checkout specification.

Identification of MOL/ITL facility change requirements (input to FCEI development).

Identification of Gemini AGE/ITL interfaces (input to interface specifications).

Identification of potential Titan III and MOL-HSQ-peculiar end-item specification changes.

The format of these outputs shall be suitable for requesting contract change to add the work identified to that presently under contract and shall include cost and schedule effects.

Facility Criteria Development - Concurrent with the AGE compatibility study, detailed facility concepts and criteria will be developed to integrate the MOL/Gemini requirements into the launch complex. The criteria will be prepared as an addendum to IFS-TIII-32000, Addendum I, Rev I.

Facility criteria will be based on the requirements of the MOL-HSQ Simulated Laboratory as defined by Martin studies and the Gemini requirements from MAC. These data will be used by Martin, assisted by DMJM (the A&E designated by SSD), to establish the modifications necessary to the existing ITL configuration to support the MOL-HSQ. Criteria, concepts, and interface data for these modifications will be documented in the format of specifications and drawings in the addendum to IFS-TIII-32000. Verification test requirements for the facility also will be included.

Subsequent to specification approval and implementation go-ahead, Martin, as the Integrating Contractor, will conduct reviews of DMJM preliminary and final construction drawings to determine that the requirements of the vehicle and the addendum to IFS-TIII-32000 have been maintained during design. Martin will also serve as integrator for facility design problems that may arise during design and construction of the facilities modifications.

A Facility Validation Test Plan, prepared by DMJM, will define procedures and detailed testing and will be used to control the acceptance testing of the facility. Martin will review the Facility Validation Test Plan. Surveillance of construction and test will be conducted by Martin-Canaveral personnel.

2. Design

The basic design tasks are to generate and release engineering drawings and detailed specifications to enable procurement, build, installation and/or modification of hardware required for the program. The process begins with review of specifications, criteria, studies and analyses to establish all design requirements. After appropriate tradeoffs, a firm design approach will be established. Components and materials comprising the final

system will then be selected. A primary ground rule will be to use those items designed or selected for use on previous programs to the fullest extent possible. If suitable hardware is not available, the designer will evaluate alternative items and attempt to use off-the-shelf equipment in preference to specially developed equipment. Test data will be reviewed to support the selection of special items. Throughout the design process, the design engineers will continue to be guided by the component and system performance requirements set forth in the design criteria and specifications. Special attention will be given to the reliability, environmental, and electromagnetic interference (EMI) requirements.

Initial program definition requires design efforts primarily in structural, instrumentation, and electrical areas on both AVE and ACE. As additional program requirements are defined, particularly in the Gemini AGE area, these efforts will be expanded and mechanical effort undoubtedly will be required.

Airborne Structures - The Simulated Laboratory configuration consists of three basic structural parts: the aft skirt, modified Titan II Stage I oxidizer tank, and forward skirt. The aft skirt is longeron, skin-stringer, frame construction. The eight longerons mate with the eight longerons in the Titan III Transtage. These longerons redistribute a portion of their load to 10 stringers to form an aft skirt configuration representative of a potential MOL configuration. The forward end of the aft skirt is welded to the modified oxidizer tank in conventional Titan II manner, but has an additional external circumferential splice strap. The oxidizer tank has been beefed up by adding additional stringer area and new frames. A portion of the aft dome has been cut away, while the forward dome remains intact. The forward dome is beefed up to withstand a negative (collapsing) pressure differential of 3.0 psig. An orifice plate is added to the aft dome opening to control tank pressure during boost phase to prevent negative (collapsing) pressures from existing across the tank barrel. The forward skirt consists of skin with 92 ribs with the aft end being monocoque and welded to the oxidizer tank in the conventional manner. The forward end of the skirt is also monocoque with a Titan II/Gemini adapter interface ring to properly mate with the 20-bolt pattern found on the Gemini adapter.

A Titan III instrumentation truss is located in the aft skirt area for installation of instrumentation equipment and associated electrical units. Minor modifications to this truss will be required to install equipment mounting bracketry. As the detail design progresses it is anticipated that cost-saving studies will dictate minor changes to the basic structural concept.

Airborne Instrumentation - The defined Simulated Laboratory instrumentation system has 10 strain-gage transducers for measuring buffet and steady-state pressures, and six thermocouples to measure skin temperatures during the ascent phase of the flight. Signals from these end instruments, after encoding, are fed to a PCM transmitter for transmission to the ground. A single sideband (SSB) system is provided to transmit high-frequency signals, primarily sound and vibration. The existing contract does not provide for transducers and signal conditioning to make these types of measurements, but contractual action is in process to add a total of 14 vibration and sound pressure level measurements to the HSQ vehicle. Contractual action is also in process to add more PCM measurements. In both cases some of these measurements will originate in the McDonnell Gemini adapter. Table V-1 lists measurement numbers, description, range, location, and sampling rate for measurements either contracted for or pending.

The accuracy of the HSQ PCM and SSB systems are the same as the Martin-provided PCM and SSB system flown on Titan III.

Airborne Electrical - An airborne power system will be provided in the Simulated Laboratory for the telemetry subsystem. This will be a 28 v battery system with provisions for ground power application and airborne transfer capability. A payload discrete will be provided to Gemini from the Transtage. The Transtage umbilicals will be used for telemetry control, monitoring, and ground power application from the AGE during checkout.

Ground Structures - All of the ground structural work now identified is peculiar to the Simulated Laboratory. It is comprised of a hoisting adapter and a platform adapter for the VIB at the Gemini mating level. The Stage II transtainer will be used to ship the Simulated Laboratory.

As the Gemini AGE study progresses, and when the FCEI Specification, especially that part dealing with the environmental enclosure, is completed and approved, there will be considerable expansion of design effort in the structural AGE area to suit the newly defined requirements.

Table V-1 MOL-HSQ Telemetry Measurements

Number	Description	Range	Sampling Rate (samples/sec)	Location (Approximate)
HSQ 201	Temperature, Skin, Forward Skirt	0 to 3 Btu/sq ft/sec	20 to 40	Sta -305, Quad. I
HSQ 202	Temperature, Skin, Forward Skirt	0 to 3 Btu/sq ft/sec	20 to 40	Sta -305, Quad. III
HSQ 203	Temperature, Skin, Tank	0 to 3 Btu/sq ft/sec	20 to 40	Sta -246, Quad. III
HSQ 204	Temperature, Skin, Tank	0 to 3 Btu/sq ft/sec	20 to 40	Sta -246, Quad. I
HSQ 205	Temperature, Skin, Tank	0 to 3 Btu/sq ft/sec	20 to 40	Sta -123, Quad. I
HSQ 206*	Temperature, Skin, Tank	0 to 1000°F	20	Sta -123, Quad. I
HSQ 001	Pressure, Inside Aft Skirt	0 to 15 psia	100	Sta 40, Quad. III
HSQ 002*	Pressure, Inside Forward Skirt	0 to 15 psia	100	Sta -312, Quad. III
HSQ 003*	Pressure, Inside Tank	0 to 15 psia	100	Sta -60, Quad. III
HSQ 041*	Pressure Differential, Skin, Forward Skirt	±10 psid	100	Sta -311, Quad. III
HSQ 042*	Pressure Differential, Skin, Forward Skirt	±10 psid	100	Sta -311, Quad. IV
HSQ 043*	Pressure Differential, Skin, Forward Skirt	±10 psid	100	Sta -311, Quad. I
HSQ 044*	Pressure Differential, Skin, Forward Skirt	±10 psid	100	Sta -311, Quad. I, II
HSQ 045	Pressure Differential, Skin, Forward Skirt	±10 psid	100	Sta -311, Quad. II
HSQ 046	Pressure Differential, Skin, Tank	±5 psid	100	Sta -239, Quad. III, IV
HSQ 047	Pressure Differential, Skin, Tank	±5 psid	100	Sta -239, Quad. I, II
HSQ 048	Pressure Differential, Skin, Aft Skirt	±5 psid	100	Sta -38, Quad. III
HSQ 049	Pressure Differential, Skin, Aft Skirt	±5 psid	100	Sta 38, Quad. IV
HSQ 050	Pressure Differential, Skin, Aft Skirt	±5 psid	100	Sta -38, Quad. II
HSQ 276	SPL Forward Skirt	5v, pp	Single Side-band	Sta -322, Quad. IV
HSQ 277	SPL Tank	5v, pp	Single Side-band	Sta -239, Quad. III
HSQ 278	SPL Tank	5v, pp	Single Side-band	Sta -239, Quad. III, IV
HSQ 279	SPL Tank	5v, pp	Single Side-band	Sta -279, Quad. IV, I

Table V-1 (Cont)

Number	Description	Range	Sampling Rate (samples/sec)	Location (Approximate)
HSQ 601	Vibration (Triax), Forward Skirt	5v, pp	Single Side-band	Sta -311, Quad. III, IV
HSQ 602	Vibration (Triax), Forward Skirt	5v, pp	Single Side-band	Sta -311, Quad. I, IV
HSQ 603	Vibration (Triax), Forward Skirt	5v, pp	Single Side-band	Sta -311, Quad, I, II
HSQ 604	Vibration (Triax), Tank	5v, pp	Single Side-band	Sta -239, Quad. III, IV
HSQ 605	Vibration (Triax), Tank	5v, pp	Single Side-band	Sta -239, Quad. I, IV
HSQ 606	Vibration (Triax), Aft Skirt	5v, pp	Single Side-band	Sta -70, Quad. I, IV
HSQ 081*	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -324, Quad. II, III
HSQ 082*	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -319, Quad. II, III
HSQ 083*	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -313, Quad. II, III
HSQ 084*	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -304, Quad. II, III
HSQ 085	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -292, Quad. II, III
HSQ 086	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -324, Quad. I, IV
HSQ 087	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -324, Quad. II
HSQ 088	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -324, Quad. II
HSQ 089	Pressure Buffet, Forward Skirt	±5 psid	400	Sta -324, Quad. II
HSQ 090	Pressure Buffet, Tank	±5 psid	400	Sta -262, Quad. II, III
HSQ 091	Pressure Buffet, Tank	±5 psid	400	Sta -262, Quad. III, IV
HSQ 092	Pressure Buffet, Tank	±5 psid	400	Sta -226, Quad, III, IV
HSQ 121	Acceleration (Long.), Tank	±10 g	200	Sta -146, Quad. III
HSQ 122	Acceleration (Lat), Tank	±2.5 g	200	Sta -146, Quad. III
HSQ 123	Acceleration (Vert), Tank	±2.5 g	200	Sta -146, Quad. III
HSQ 124	Acceleration (Long.), Aft Skirt	±10 g	200	Sta -70, Quad. III

Table V-1 (Concl)

Number	Description	Range	Sampling Rate (samples/sec)	Location (Approximate)
HSQ 125	Acceleration (Lat), Aft Skirt	2.5 g	200	Sta -70, Quad. III
HSQ 126	Acceleration (Vert), Aft Skirt	2.5 g	200	Sta -70, Quad. III
HSQ 161*	10 vdc Supply	0 to 15 vdc	40	Aft Skirt
HSQ 162	10 vdc Supply	0 to 15 vdc	40	Aft Skirt
HSQ 163	10 vdc Supply	0 to 15 vdc	40	Aft Skirt
HSQ 164	28 vdc Current	0 to 50 amp	100	Aft Skirt
HSQ 165	28 vdc Battery Voltage	0 to 35 vdc	100	Aft Skirt
HSQ 166	Separation Enable Discrete	--	100	Forward Skirt
KC 50	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 51	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 52	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 52	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 53	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 54	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 55	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 56	Gemini Adapter Measurement	--	20	Gemini Adapter
KC 57	Gemini Adapter Measurement	--	20	Gemini Adapter
KD 01	Gemini Adapter Measurement	--	20	Gemini Adapter
KD 02	Gemini Adapter Measurement	--	20	Gemini Adapter
QH 01	Vibration, Gemini Adapter	--	Single Sideband	Gemini Adapter
QH 02	Vibration, Gemini Adapter	--	Single Sideband	Gemini Adapter
QH 03	Vibration, Gemini Adapter	--	Single Sideband	Gemini Adapter
QH 04	Vibration, Gemini Adapter	--	Single Sideband	Gemini Adapter

*Indicates these measurements are, with the exception of location, those covered by Current Contract. All other measurements were agreed to in the Design Review and are being proposed.

Ground Instrumentation - One receiver rack of the GIE will be modified by the addition of new crystals to accommodate the new telemetry frequencies. A control box will be provided on the instrumentation console that will turn the PCM and SSB transmitters on and off. This control will also allow the output of the SSB calibrator in the instrumentation van to be switched into the SSB unit. A switch box on the instrumentation control console and associated wiring will be provided for ground control of the PCM and SSB transmitters of the Simulated Laboratory and calibration of the Laboratory's SSB unit. To provide closed-loop RF checkout of the laboratory telemetry system, RF coaxial landlines will be used between the VIB cell and the instrumentation receiver rack. Closed-loop checkout will be provided from the launch pad by coaxial access lines for the PCM and SSB subsystems of the Laboratory. The Simulated Laboratory's SSB unit will be calibrated by the existing calibrator in the instrumentation van on a time-shared basis. New circuits will be installed that connect the output of this calibrator to the new SSB unit.

After flight data are recorded on magnetic tape at ETR, the tape(s) will be transported to Denver for processing and analysis for the flight report. The PCM and SSB data (when measurements are added to the SSB unit) will be reduced with the same methods now being used in Titan III. Data handling and transfer to MAC and other agencies is not required as part of the statement of work. Therefore, any transfer, reduction, or data processing other than the 17 defined measurements is not part of this program plan.

Ground Electrical - The electrical OGE modifications imposed by the Simulated Laboratory requirements are discussed here.

The Van Power Distribution Control (VPDC) unit modification will include provision for supply, control, and monitoring of the Simulated Laboratory 28-vdc power. Two 28-vdc readiness power feeders will be provided. One feeder will supply readiness power to the Simulated Laboratory Power Supply (SLPS) bus, the other will supply power to SLPS battery simulator cable. The VPDC control circuitry will be modified to provide for application of SLPS ground power on command from the Launch Control Console (LCC) and will include a provision for control of the SLPS power transfer switch to transfer the SLPS from ground to airborne power.

The VPDC monitoring circuitry will be modified to monitor and display SLPS battery, SLPS bus, and power transfer switch status with existing displays. A separate undervoltage sensor will monitor the SLPS bus during the application of either ground or airborne power. The output of this undervoltage sensor will be summed with existing undervoltage sensors to provide "IPS Bus Voltage in Limits" signal to CMG.

Note that VPDC modifications for VTF and ITL units will not be identical due to the difference in the configuration status of the units.

Several spare channels of the Data Transmission System will be assigned for transmission of instrumentation command signals from Control Center to the GIE Van. No hardware changes will be required, except external wiring.

New power cabling and coaxial cable in the ground installation will be installed to fulfill the requirements of the HSQ flight. Criteria for selection, use, and installation will follow established Titan III philosophy and design. Detailed identification of additional new requirements for Gemini depend on final results of AGE study.

3. Test Planning and Evaluation

The MOL-HSQ program will require new HSQ-peculiar planning documentation. Also, existing Titan III documents will be changed where necessary. The items identified as being affected are described here.

Subsystem Test Plan - This plan will define those Martin tests to be performed on the Simulated Laboratory and Transtage to confirm the assigned performance. This plan is presently restricted to structural testing of the Simulated Laboratory. The test specimen will be the actual Laboratory plus a Gemini HSQ boilerplate adapter section supplied by MAC.

System Test, Electromagnetic Compatibility (EMI/EMC) - Requirements and success criteria of this test will be defined in the EMC Integrated Test Plan, but in general will fulfill the following criteria. EMI control for the Martin-furnished hardware for the HSQ flight will be in general accordance with the established Titan III design philosophy, including interface analysis. Prior to the formal launch CST, an electromagnetic

compatibility (EMC) test will be performed after the complete core vehicle has been assembled with the Simulated Laboratory and Gemini Spacecraft. This will include an integrated CST (countdown and simulated flight through ascent, release of reentry module, and reentry of Gemini to splashdown) where Gemini ordnance devices and/or critical circuits will be simulated with low-energy simulator units, and selected points on Titan III will be monitored with appropriate devices to verify that no malfunction occurs or ordnance element initiates prematurely. The specific test requirements will be defined in the EMC test plan.

Titan III Test Plans - All Titan III test plans will be reviewed to determine the impact of MOL-HSQ changes. If any additional testing is required, separate plan changes will be prepared and submitted through the SSD Titan III Program Office. No additional Titan III tests have been identified to date.

Titan III Flight Test Plan - An addendum will be prepared to the existing test plan that sets forth the objectives, test methodology, sequencing requirements, test configuration, and a gross description of the internal and external instrumentation requirements for all system level tests. Gemini data will be integrated into the plan to the extent required. This document will be submitted to the SSD-MOL Program Office.

Program Requirements Document - An addendum will be prepared to the existing Titan III document. The current plan is to submit incremental changes to the existing document based upon certain major events occurring during the program. These events are:

- Total configuration concepts available;
- Systems operational sequences and data requirements established;
- Detailed facilities and support requirements established;
- Antenna radiation tests complete.

The time span for these submittals will be from May to December 1965. Gemini requirements will be integrated into the document by Martin for range support through Gemini separation.

Engineering Test Orders (ETOs) - The Martin Company has found during the Titan I, II, and III programs that contractual planning documents submitted well in advance of flight dates are difficult to change with respect to details of test requirements that can only be identified just before a particular launch. As a result, we have developed the ETO. This document generally contains a current restatement of objectives; responsibilities; final test methodology including test precautions, "hold" and other special parametric considerations; as well as any special testing requirements. In general the document serves as the final statement of technical direction from the home plant to the Launch Test Working Group (LTWG) representative. This representative then obtains LTWG approval and arranges necessary changes to the Launch Test Directive and Operations Requirements Documents.

Test Reports - Several test reports will be prepared during the MOL-HSQ program. Those currently identified are subsystem test reports, EMC test report, and final flight test report.

Subsystem Test Reports - Separate reports will be prepared and submitted within 30 days following each major test defined in the subsystem test plan. The reports will be based on final analyzed data, as well as Test Observer's reports. The only subsystem test presently identified is the static load test of the Simulated Laboratory.

EMC Test Report - A separate test report will be prepared and submitted to SSD summarizing the results of special EMC testing during the program. The report will be based on analyzed data and will contain results of the integrated testing to be conducted at the ETR. This report will be in accordance with the DRD.

Final Flight Test Report - This report will be prepared and submitted to SSD-MOL Program Office within 30 days of receipt of all range and Gemini data at the contractor's plant. It will be based on final analyzed data, special confirmation test data, observers reports, as well as any Titan III data that supports or interprets a deviation from predicted performance to the time of Gemini separation. Gemini data and conclusions will be included to the extent required to justify Simulated Laboratory performance and to support Payload Integrity Program conclusions.

B. MANUFACTURING AND QUALITY PLAN

This production plan describes the manufacturing technique, fabrication sequence of assemblies and installations, manufacturing capabilities, the tooling plan, and quality surveillance.

Maximum use will be made of existing tooling and handling equipment. Any new tooling required will be ordered as "soft" tooling or shop aids with a minimal amount of tool design. Tool orders will be issued by the planner, routed to Production Control, and placed in special folders. New assembly tools will be required to build forward and aft skirts and a platform to support the Laboratory vehicle in the vertical test fixture. Tool Manufacturing will build "soft" detail tools -- such as stretch blocks, jaws, form blocks and templates to support the Laboratory detail build -- and also some structural AGE, since it will be similar to tools used for handling.

The Manufacturing Model Shop (detail area) will fabricate a 1/10-scale antenna model to support a design engineering test. Tooling will be of the shop-aid type.

As shown in Fig. V-1, Manufacturing will modify an existing Titan II, Stage I, oxidizer tank for the Laboratory flight article. While the tank is held in a rotation weld fixture, the forward skirt will be cut from the dome assembly. To allow ease of rework and installations within the barrel assembly, the aft skirt and dome combination will be cut from the barrel. Separation of the aft skirt from the dome will also be performed in the rotation fixture. The barrel will then be placed on work dollies (Fig. V-2) and all frames and dome supports removed. The barrel stringer caps will be trimmed by sawing or shearing to allow the beefed-up tee stringers to be riveted to existing skin stringers over the full length of the barrel. Frames will be installed in the barrel on the stringers and spliced in position. Next, frame-to-stringer-to-skin gussets will be installed and riveted. All work will be performed under the surveillance of Quality Control and recorded in assembly log plans.

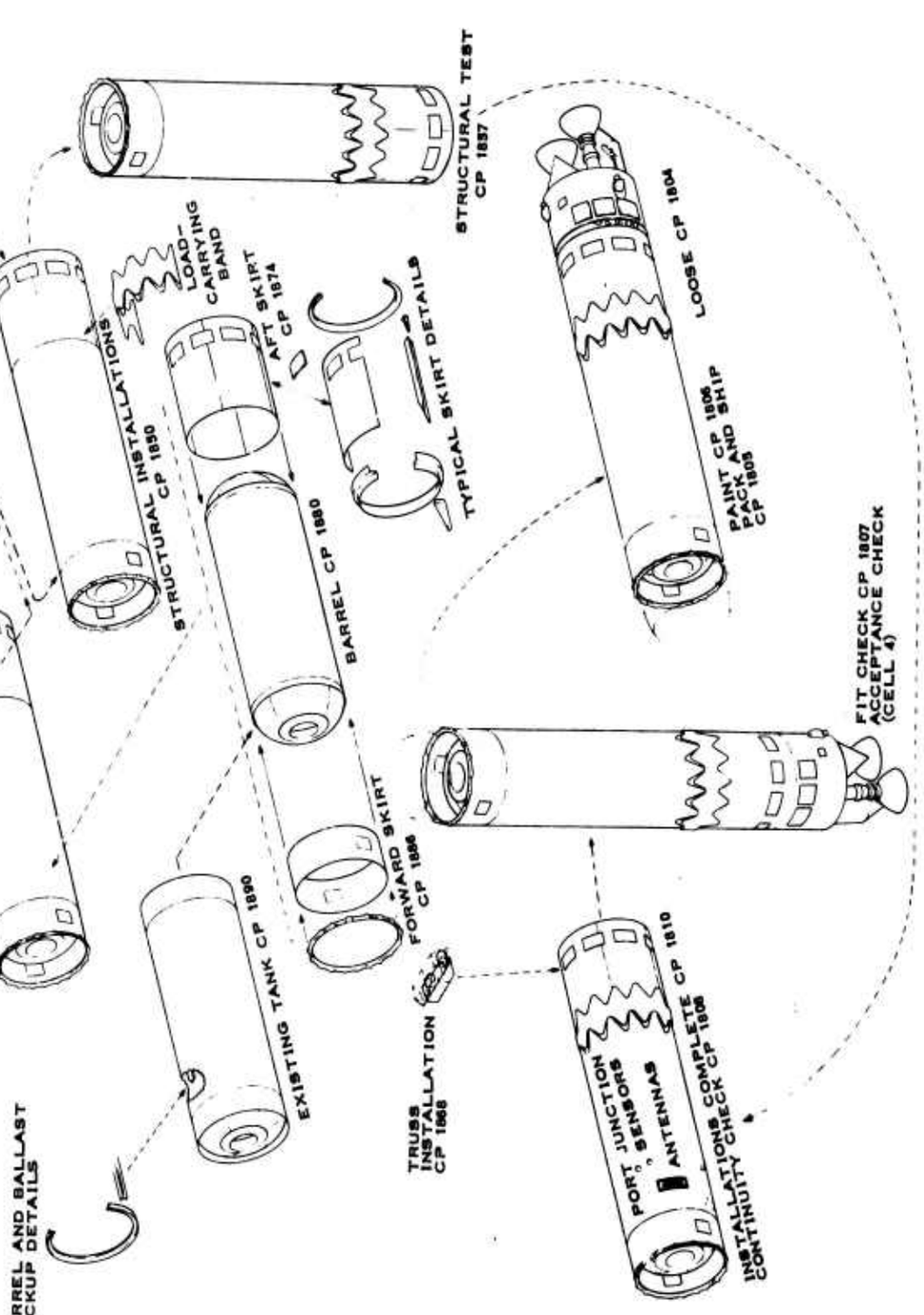


Fig. V-1 Flow Chart and Control Points for MOL-HSQ

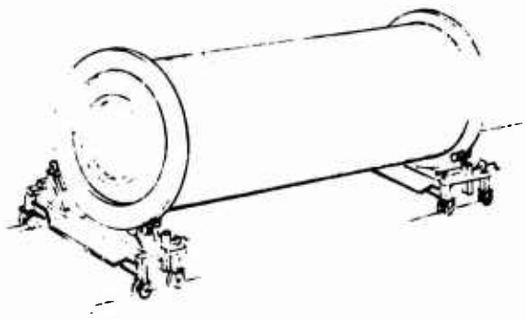


Fig. V-2 Work Dollies

A new forward and aft skirt assembly will be fabricated from frames, stringers, skins, and backup structure construction in a vertical position in "soft" tooling fixtures. Each fixture is a flat-base table, with uprights to hold the frame and skin diameters. After complete drilling and riveting, the assemblies will be moved to a clean-up dolly, where any installations, brackets, supports or interface drilling will then be performed. Note that the forward frame of the forward skirt will interface with Gemini, and the aft frame of the aft skirt will interface with the Titan III transtage. Quality Control will inspect the operations and record them in log plans.

The barrel assembly will again be placed in the rotation weld fixture and the forward skirt welded to the barrel dome. The aft skirt will be welded to the aft dome and this assembly welded to the barrel assembly. The whole assembly is then removed from the weld fixture and moved to the Quality Control X-ray area for a check of the new welds. Quality Control will perform all inspection and documentation function in preparation for Air Force acceptance.

After X-ray, the Simulated Laboratory article will be placed on work dollies in preparation for structural installations. The load-carrying bands and fillers will be located on the external skin and weld areas at the splice of the barrel to the aft skirt. The bands will be clamped, drilled, and riveted to the barrel and aft skirts. Ballast supports will be drilled to the frames and stringers and bolted in place temporarily for the fit check. The ballast will be removed and sent to the engineering test area in VTF, where Quality Control will inspect it and record the operation in the assembly log plan. A basic Titan III transtage instrumentation truss will be modified and new mounting plates and brackets added. The truss will be installed in the aft skirt and holes will be drilled from truss pads through the skirt frame, after which the truss will be bolted in place and Quality Control will inspect and record the operation.

The Simulated Laboratory will be placed on an erection dolly (Fig. V-3) and sent to VTF for engineering structure test. Manufacturing will assist Engineering in the static test effort.

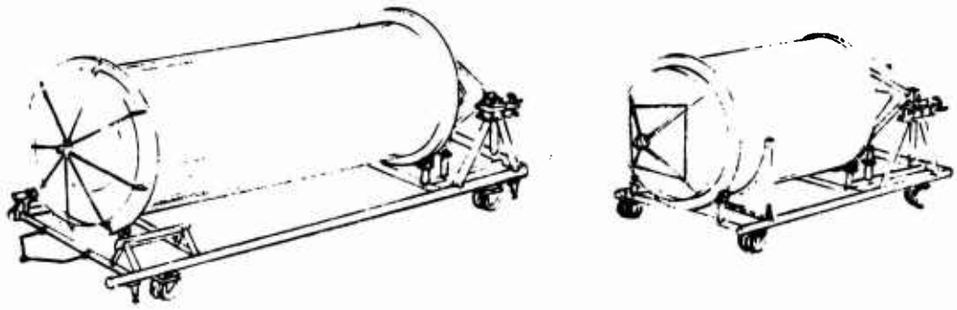


Fig. V-3 Erection Dollies (Lab and Transtage)

After the Laboratory article is returned from test, it will be put on work dollies. All work will be performed under the surveillance of Quality Control. The wiring, harnesses, instrumentation, and antennas will be installed on the Laboratory article, and the truss will be installed on the skirt frame. Doors will be bolted to the skirt, and the cover installed on the forward dome. Quality will inspect and record the operation log plans. A point-to-point continuity and megger check will be performed of the electrical and instrumentation harness. The laboratory article is then put on an erection dolly and sent to VTF for acceptance check.

Certain modifications are required to the Titan III SLV-9 Transtage for the MOL-HSQ flight. At present, these changes only involve mounting new connectors at Station 77 and wiring them to the Transtage's umbilical connector. These changes will provide ground power and remote telemetry system control for the Simulated Laboratory. Following installation, continuity and megger tests, and Quality inspection, the Transtage will be moved to the VTF.

In the VTF the Titan III Transtage will be erected on a mounting platform in Cell P-4. The Laboratory article will be mated to the Transtage with bolts through longerons. Quality Control will check interfaces and record the operation. The System Test and Support Department will perform acceptance check, and Quality Control will inspect and document all functions in preparation for Air Force acceptance of the completed payload. The assemblies are then removed from VTF and sent back to the factory for pack and ship.

Before pack and ship the Simulated Laboratory will be weighed, cleaned, and painted, as required. All loose items such as ballast weights, batteries, etc, will be shipped separately. The Laboratory will be prepared for shipment and moved from the manufacturing dolly to a Stage II transtainer (Fig. V-4).

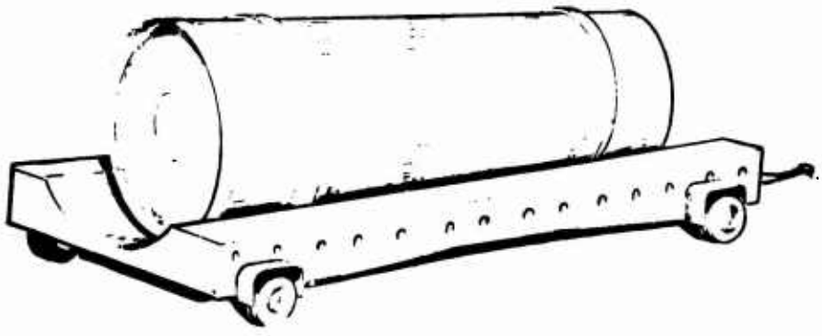


Fig. V-4 Laboratory on Stage II Transtainer

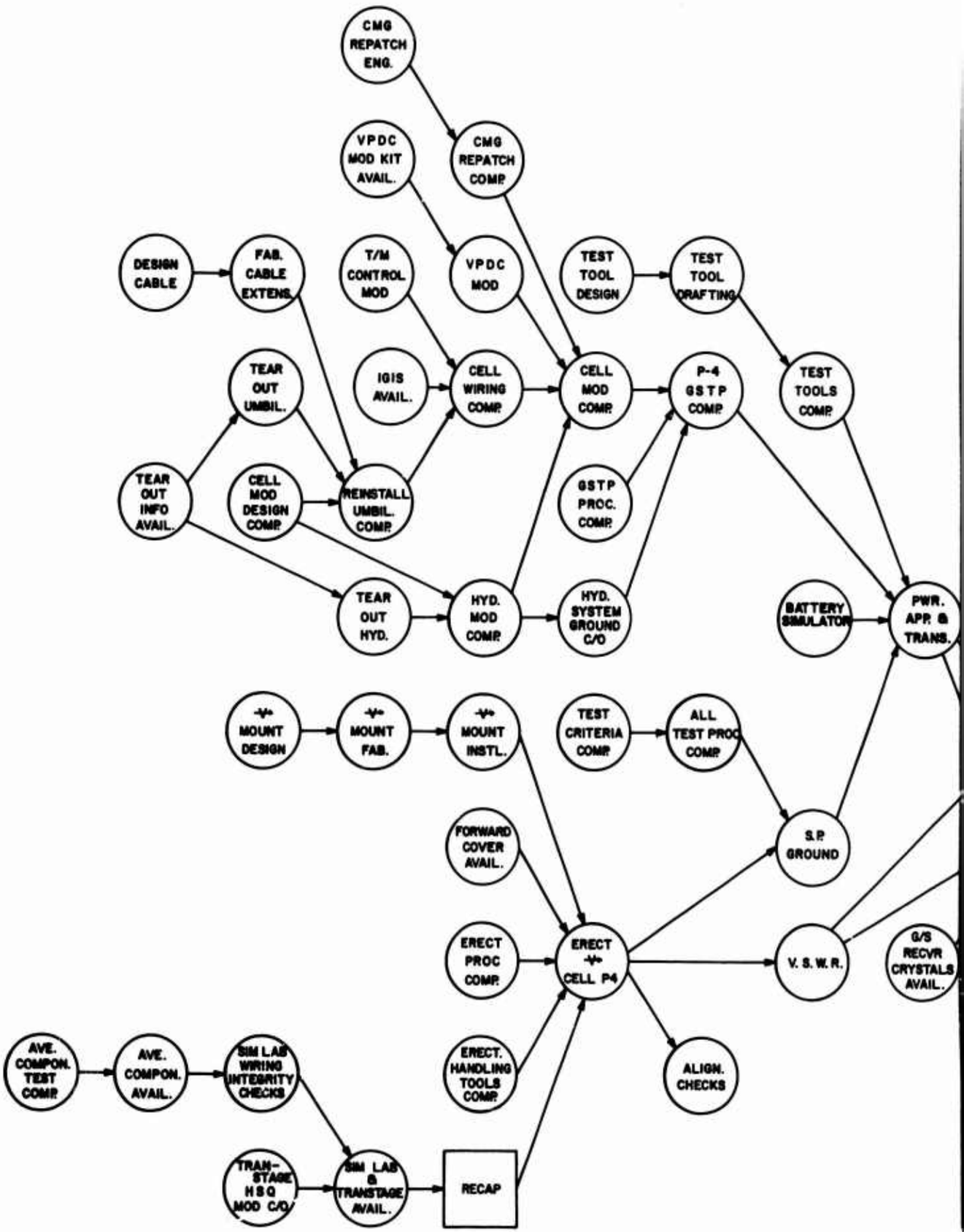
Ground equipment to support the program will be fabricated in the Manufacturing area using shop aids and layout as required to build platform adapters and hoisting equipment. The Electrical Group will fabricate and assemble into adapter kits the electrical equipment necessary to support the Simulated Laboratory. Quality Control will document the progress and test activity of all operations in accordance with the process logs and test procedures. Following acceptance of the various AGE items, they will be packed and shipped to ETR for installation.

C. ACCEPTANCE TEST PLAN

The MOL-HSQ Simulated Laboratory will be accepted at Martin-Denver by Certificate of Completion (COC). The specific actions required to obtain this COC, together with the definition of the associated organizational responsibilities, are presented in this Acceptance Plan. A complete flow sequence for the laboratory testing is shown in Fig. V-5. This plan encompasses more than just the formal acceptance actions. It also defines the series of key steps to be taken before acceptance testing begins that will provide incremental agreement between all parties involved on the design and fabrication of airborne systems. These pre-acceptance actions are aimed at increasing assurance of vehicle quality and design compliance.

The overall program can be summarized in six sequential steps: technical design reviews, incremental quality reviews, acceptance test plan approval, acceptance testing, acceptance test review and approval, and issuance of the COC. Although the first two steps are not normally considered as part of acceptance procedures, they are basic to the MOL-HSQ acceptance philosophy. The formal acceptance test proves that operational subsystems function as specified. The design and quality reviews add assurance that all elements of the vehicle should function as required and that reliability has been maximized with program limitations.

MOL-HSQ design reviews fall into two categories: a formal design review and incremental informal reviews. The formal design review was completed on 24 September 1965 and all action items will be closed by 1 December 1965. This review was conducted by representatives of SSD and Aerospace from both the MOL and Titan III Program Offices. All subsystems were reviewed in detail from the standpoints of specification compliance and sound engineering practice. Successful completion of this review established approval of the Martin design and a baseline for future considerations. In addition, the Martin Company will conduct a number of informal but detailed reviews with SSD/Aerospace MOL Program Office personnel and also with review teams from Martin Engineering. These reviews will concentrate on considering all changes that occur in the baseline design. Acceptance of the system design provides the basic foundation for the acceptance of the article.


CMG REPATCH ENG.
VPDC MOD KIT AVAIL.
CMG REPATCH COMP.
DESIGN CABLE
FAB. CABLE EXTENS.
T/M CONTROL MOD
VPDC MOD
TEST TOOL DESIGN
TEST TOOL DRAFTING
TEAR OUT UMBIL.
IGIS AVAIL.
CELL WIRING COMP.
CELL MOD COMP.
P-4 GSTP COMP.
TEST TOOLS COMP.
TEAR OUT INFO AVAIL.
CELL MOD DESIGN COMP.
REINSTALL UMBIL. COMP.
GSTP PROC. COMP.
TEAR OUT HYD.
HYD. MOD COMP.
HYD. SYSTEM GROUND C/O
BATTERY SIMULATOR
PWR. APP. & TRANS.
MOUNT DESIGN
MOUNT FAB.
MOUNT INSTL.
TEST CRITERIA COMP.
ALL TEST PROC COMP.
FORWARD COVER AVAIL.
S.P. GROUND
ERECT PROC COMP.
ERECT -V- CELL P4
V. S. W. R.
G/S RECVR CRYSTALS AVAIL.
AVE. COMPON. TEST COMP.
AVE. COMPON. AVAIL.
SIM LAB WIRING INTEGRITY CHECKS
ERECT. HANDLING TOOLS COMP.
ALIGN. CHECKS
TRAN-STAGE HSQ MOD C/O
SIM LAB & TRANSTAGE AVAIL.
RECAP

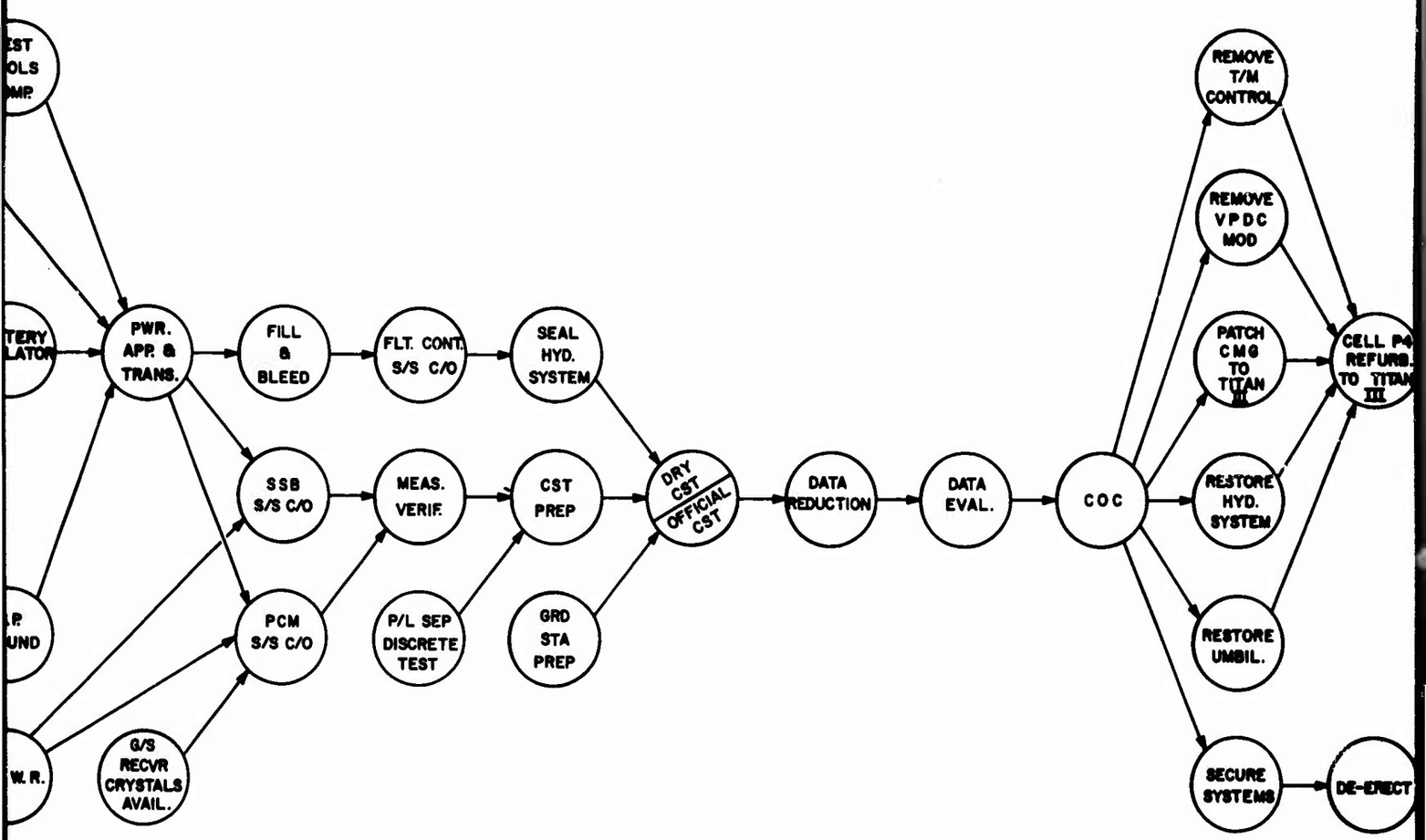


Fig. V-5 MOL-MSQ Vehicl

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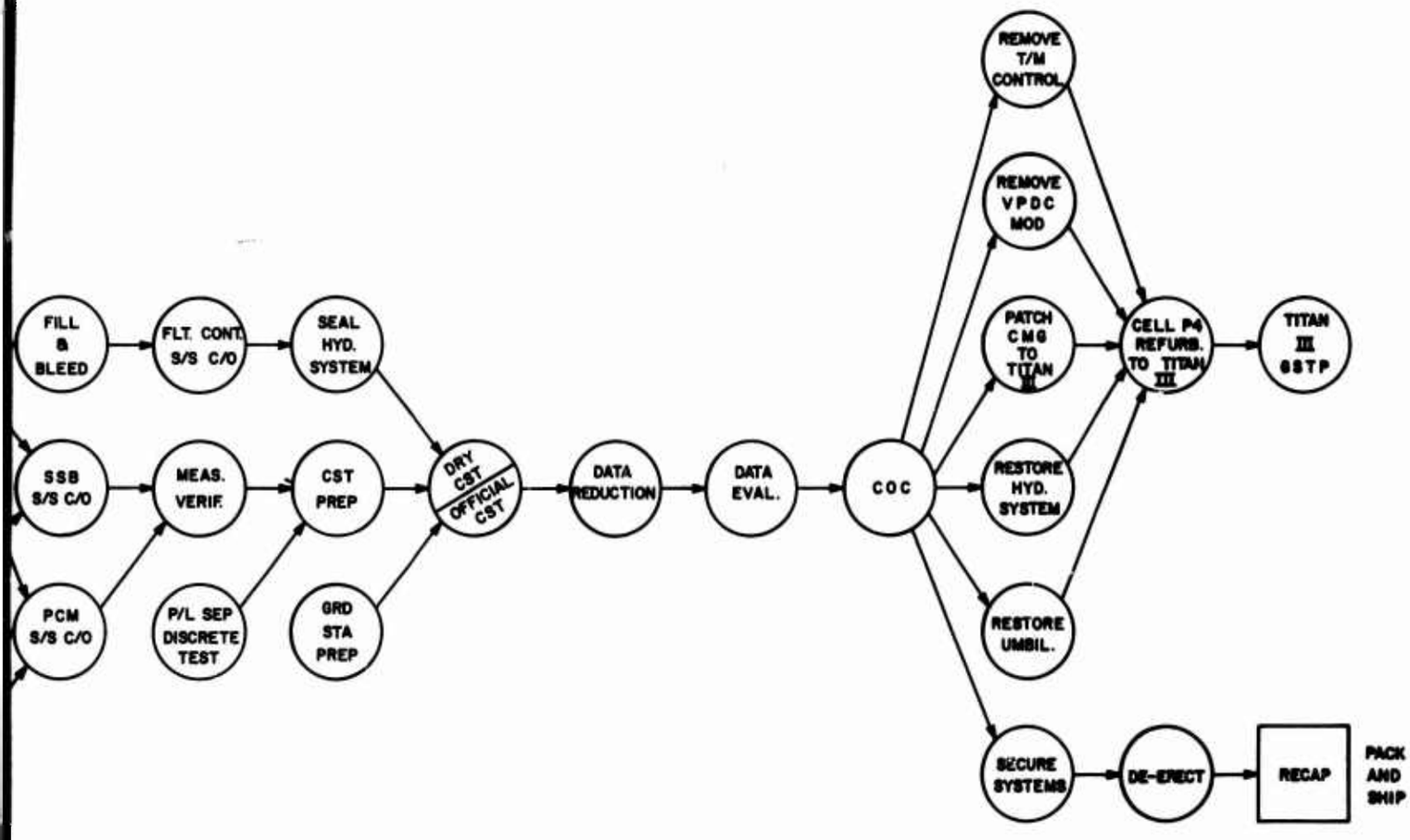

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Fig. V-5 MOL-HSQ Vehicle Test Plan Flow Chart

The next step is to ensure that the complete design has been faithfully converted into hardware. To accomplish this, a series of incremental quality reviews by Air Force Plant Representatives Office (AFPRO) personnel is planned. The relative simplicity of the Simulated Laboratory permit these reviews to be few and keyed to fabrication milestones. Five such reviews are planned, which, in general, will be made at completion of the following milestones:

1) Forward skirt assembly;

2) Aft skirt assembly;

3) Tank assembly;

4) Electrical and instrumentation assembly;

5) Final assembly.

These reviews then assure that the Laboratory has been built in compliance with the previously approved engineering design. The combination of design and quality reviews establishes the proper hardware baseline for the acceptance test.

Before test initiation, acceptance test procedures will be prepared by the Martin Company defining every test to be conducted, the exact manner in which the test is to be accomplished, and the specific criteria for acceptability. These procedures will be submitted to the MOL-HSQ Program Office and to the AFPRO for review and comment at least 30 days before the start of testing. The AFPRO will be responsible for final approval of the acceptance test procedures. This approval is required 15 days before the start of the acceptance tests.

Two types of test procedures will be prepared by Martin: Support Test Procedures and Acceptance Test Procedures. Support tests are conducted just before acceptance testing to ensure that the system is, in fact, complete and ready for acceptance. Support Test Procedures will be submitted to the AFPRO for comment, but do not require Air Force approval. Table V-2 lists the support test procedures that will be prepared and run by Martin. Other support procedures required, and not listed in the table, will be made available to the AFPRO upon request.

Table V-2 Support Test Procedures

HSQ-0G01-P4	Master Control Vehicle Securing and De-erection
HSQ-2A51-P4	C-2 Auxiliary Hydraulic Power Supply Flushing
HSQ-2C03-P4	Phasing and Static Gains
HSQ-2C20-P4	Vehicle Hydraulic System Flush and Proof Pressure
HSQ-2C21-P4	Vehicle Hydraulic System Fill and Bleed
HSQ-2C23-P4	Vehicle Hydraulic System Fill and Seal
HSQ-2G20-P4	Airborne Hydraulic System Securing
HSQ-4D02-P4	Vehicle Safety CST Preparations
HSQ-4G01-P4	Vehicle Safety Post Combined Systems Test (CST) Operations
HSQ-5B02-P4	Vehicle Erection
HSQ-5B03-P4	Vehicle De-erection
HSQ-6A52-P4	Control Monitor Group (CMG) Patching
HSQ-6A53-P4	SOCVU Functional Test
HSQ-6C04-P4	Separation Discrete Measurements
HSQ-6D01-P4	Electrical CST Preparation
HSQ-6G01-P4	Electrical Post CST Operations

Table V-2 (concl)

HSQ-7C15-P4	High Frequency and Acoustic Measurements
HSQ-7C16-P4	Level Sensors and Malfunction Detection System (MDS) Bilevel Measurements
HSQ-7C19-P4	AGC Valve Traces
HSQ-7C12-P4	Malfunction Detection System (MDS) Rate Gyro and Flight Control System (FCS) Calibration
HSQ-7C51-P4	Ground Station Setup
HSQ-7M69-P4	Equipment Calibration Requirements

The formal Acceptance Test Procedures to be prepared and submitted for Air Force approval are shown in Table V-3:

Table V-3 Formal Acceptance Test Procedures

HSQ-0C01-P4	Master Control - Vehicle Erection and Subsystems Test
HSQ-2C09-P4	VECOS/Vehicle Subsystem Checkout
HSQ-6C01-P4	Single Point Ground
HSQ-6C02-P4	Bus and Transfer Tests
HSQ-7C01-P4	Preliminary Instrumentation Checkout
HSQ-7C03-P4	Instrumentation Subsystem T/M Verification
HSQ-7C10-P4	10 v Power Supply
HSQ-7C11-P4	Power Bus Measurements
HSQ-7C13-P4	Thermocouple Measurements
HSQ-7C14-P4	Pressure Transducer Verification
HSQ-0D01-P4	Master Control - Combined System Tests
HSQ-0M01-P4	CST Data Document

In general both the Support and Acceptance Test Procedures are based on equivalent procedures employed on the Titan III program.

During the course of the acceptance tests, personnel from Development Engineering of the AFPRO will witness the conduct of the test. Although SSD and/or Aerospace personnel may observe the tests, action items will be processed only by AFPRO representative. Following completion of the tests, the Martin Company will prepare the Acceptance Team Data Package and provide these to the Air Force. This data package will contain:

1) Definition and identification of equipment to be accepted by model number (where applicable), nomenclature, part number, and serial and contract numbers.

2) Current approved model specifications (MOL-EFT-AVE-1000).

3) Approved interface control documentation, where applicable.

4) A list of hardware shortages and associated makeup dates.

5) A list of all approved Engineering Change Proposals (ECPs) and/or Class I changes.

6) Certification by the MOL-HSQ Program Implementation Manager that all facts and documentation described in 1 thru 11 are complete, accurate, and valid for the equipment being accepted.

7) A certification log of functional test results, complete with a record of functional deficiencies and corrective action taken, containing the following:

a) The certification log of final test results and a complete list of functional tests as recorded in those pertinent sections of the test procedures. These data shall be in accordance with the acceptance test requirements and recorded as test data where necessary.

b) A complete list of functional tests required by the specification but not accomplished.

c) Certification that measurements made during the acceptance tests are within instrumentation accuracies required.

8) A summary listing of the measurements made during the acceptance test, the range and accuracy of the instrumentation, and acceptable performance limits.

9) A copy of the verification and calibration of checkout and test equipment certified by the associate contractor and the AFPRO.

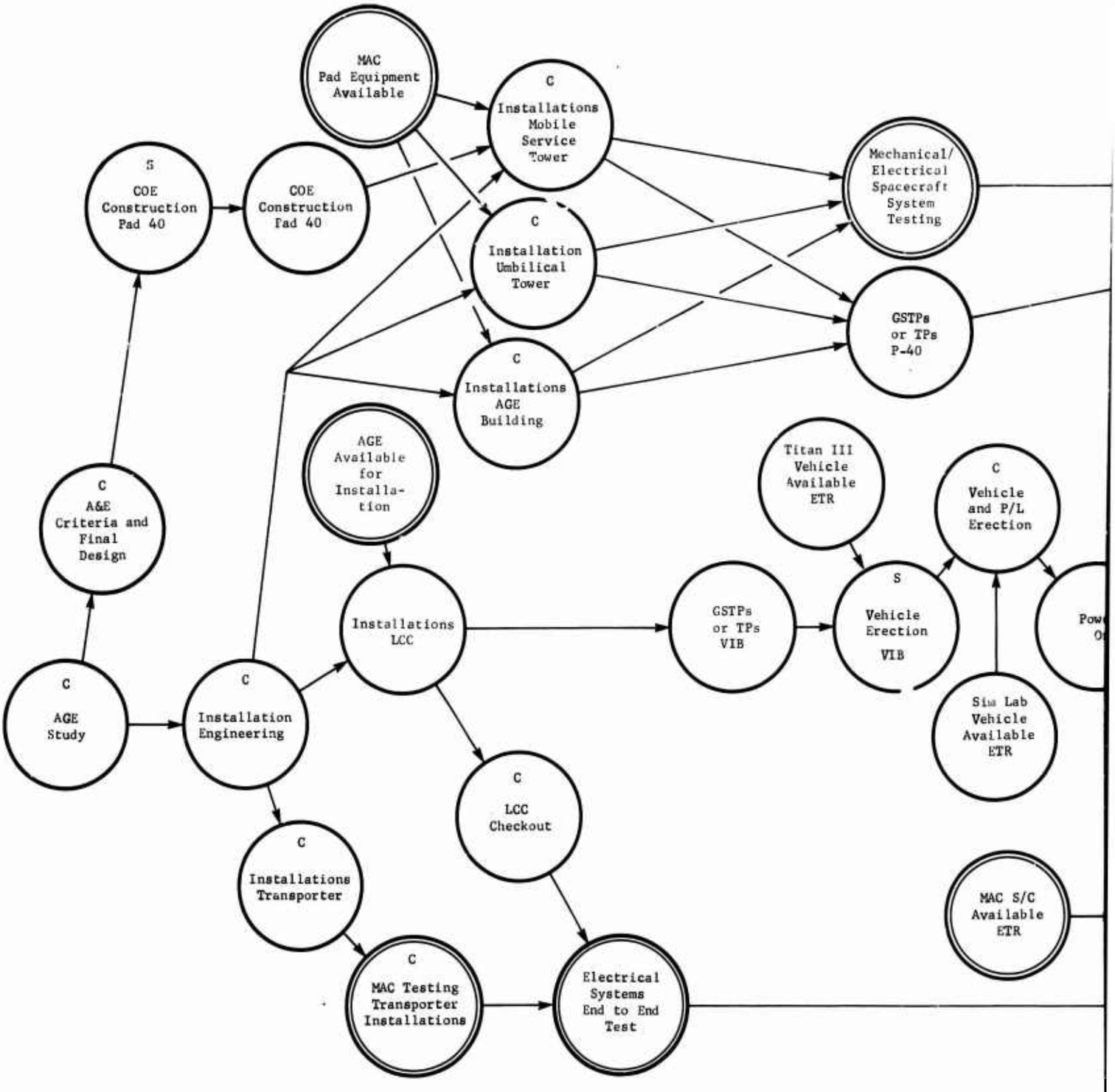
10) Calibration curves or test data for all transducers in the equipment undergoing acceptance test. The calibration shall be made on an end-to-end system basis wherever applicable.

11) Titan III transtage logs will be maintained in accordance with Titan III practices.

An area will be provided for the Air Force/Aerospace acceptance team to conduct its review. Upon successful completion of the acceptance test, the AFPRO will issue the Certificate of Completion formally accepting the Simulated Laboratory.

D. ACTIVATIONS AND LAUNCH OPERATIONS

The MOL-HSQ activation and launch operation efforts are implemented under an integration contractor-associate contractor relationship, with the Air Force (SSD) as the customer and overall manager. A flow sequence chart is shown in Fig. V-6, MOL-HSQ ETR flow plan.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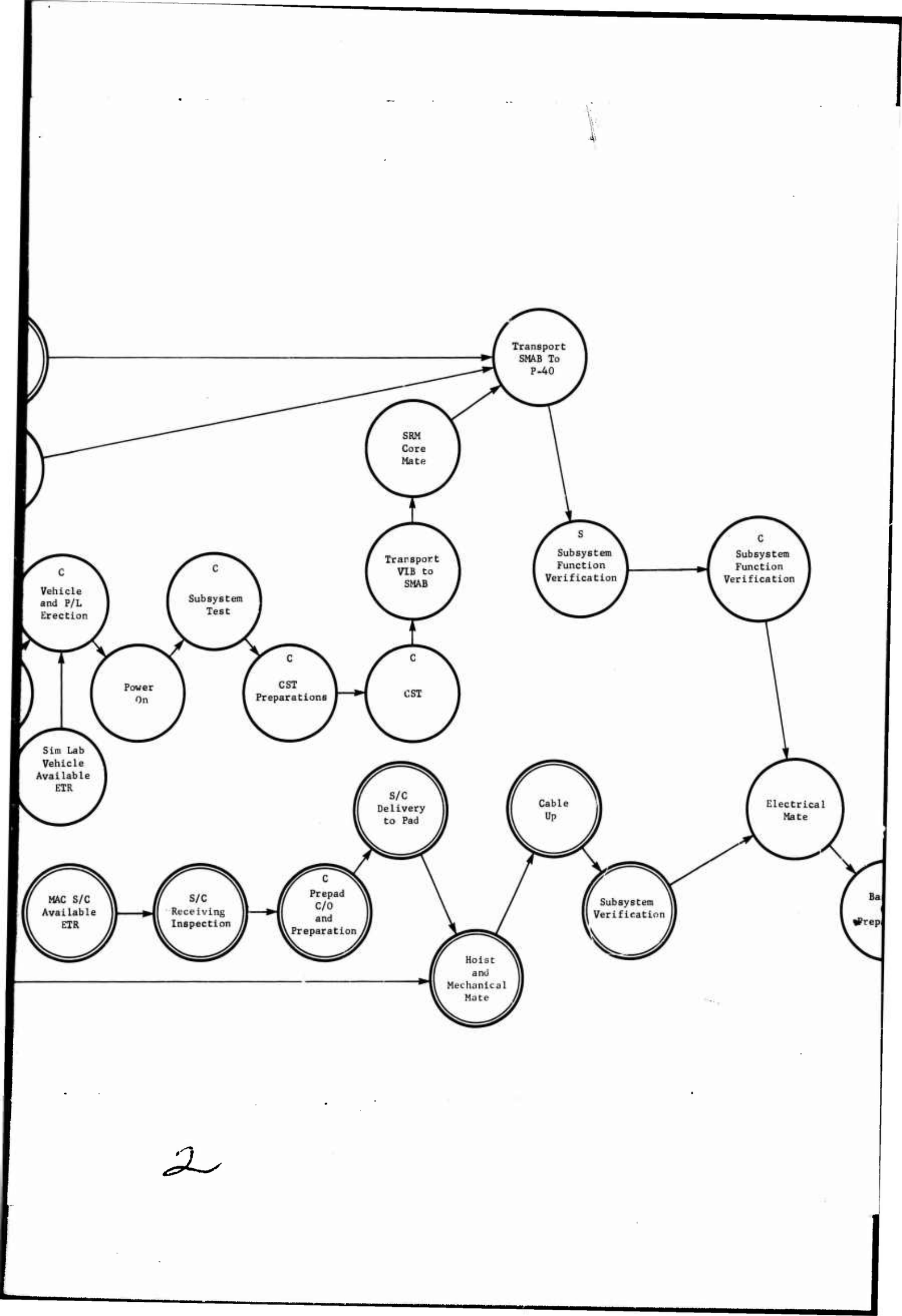
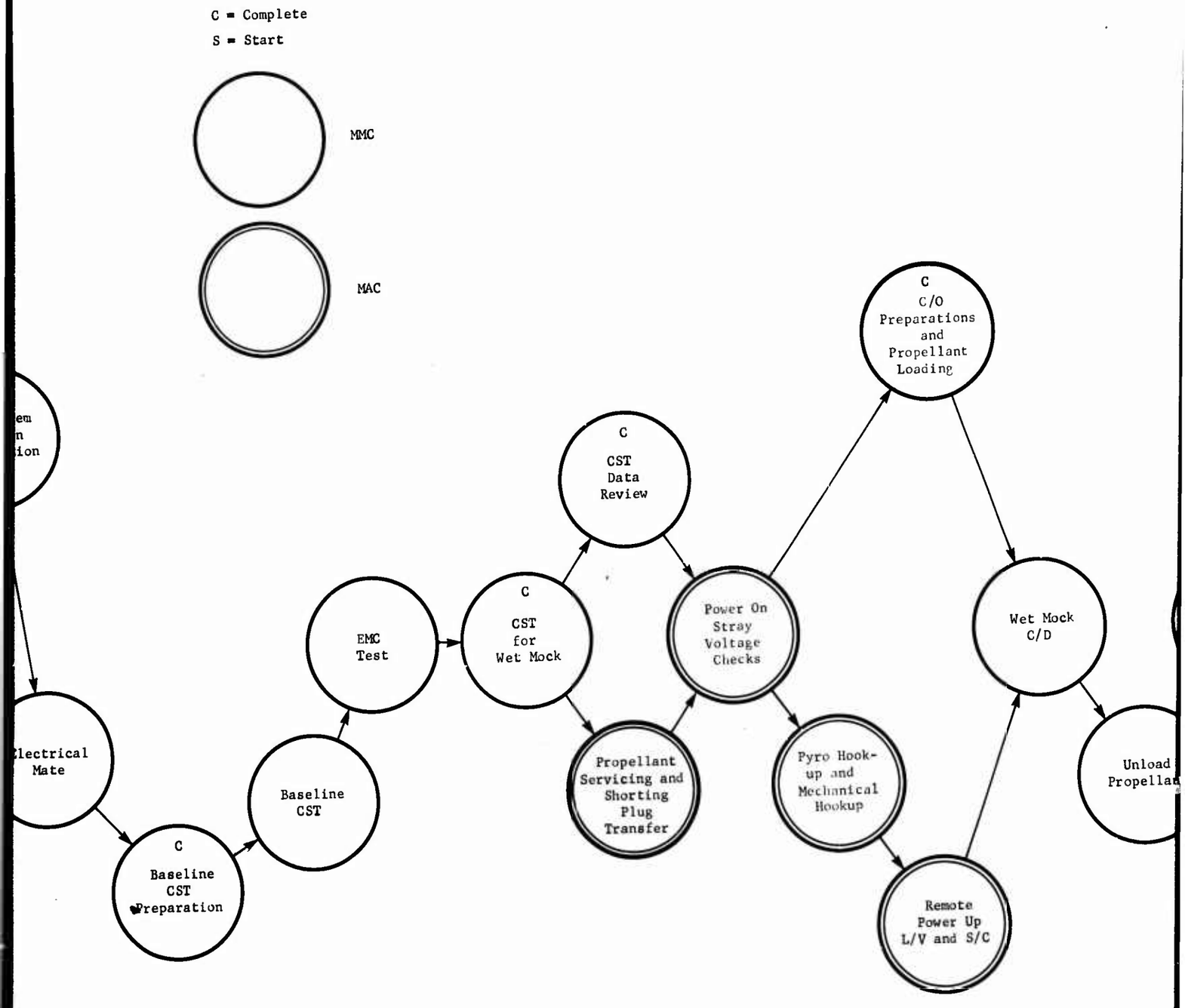

Transport SMAB To P-40
SRM Core Mate
Transport VIB to SMAB
S Subsystem Function Verification
C Subsystem Function Verification
C Vehicle and P/L Erection
C Subsystem Test
Power On
C CST Preparations
C CST
Sim Lab Vehicle Available ETR
S/C Delivery to Pad
Cable Up
Electrical Mate
MAC S/C Available ETR
S/C Receiving Inspection
C Prepad C/O and Preparation
Subsystem Verification
Hoist and Mechanical Mate

2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CST
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Servicing and
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Transfer
Power On
Stray
Voltage
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Pyro Hook-
up and
Mechanical
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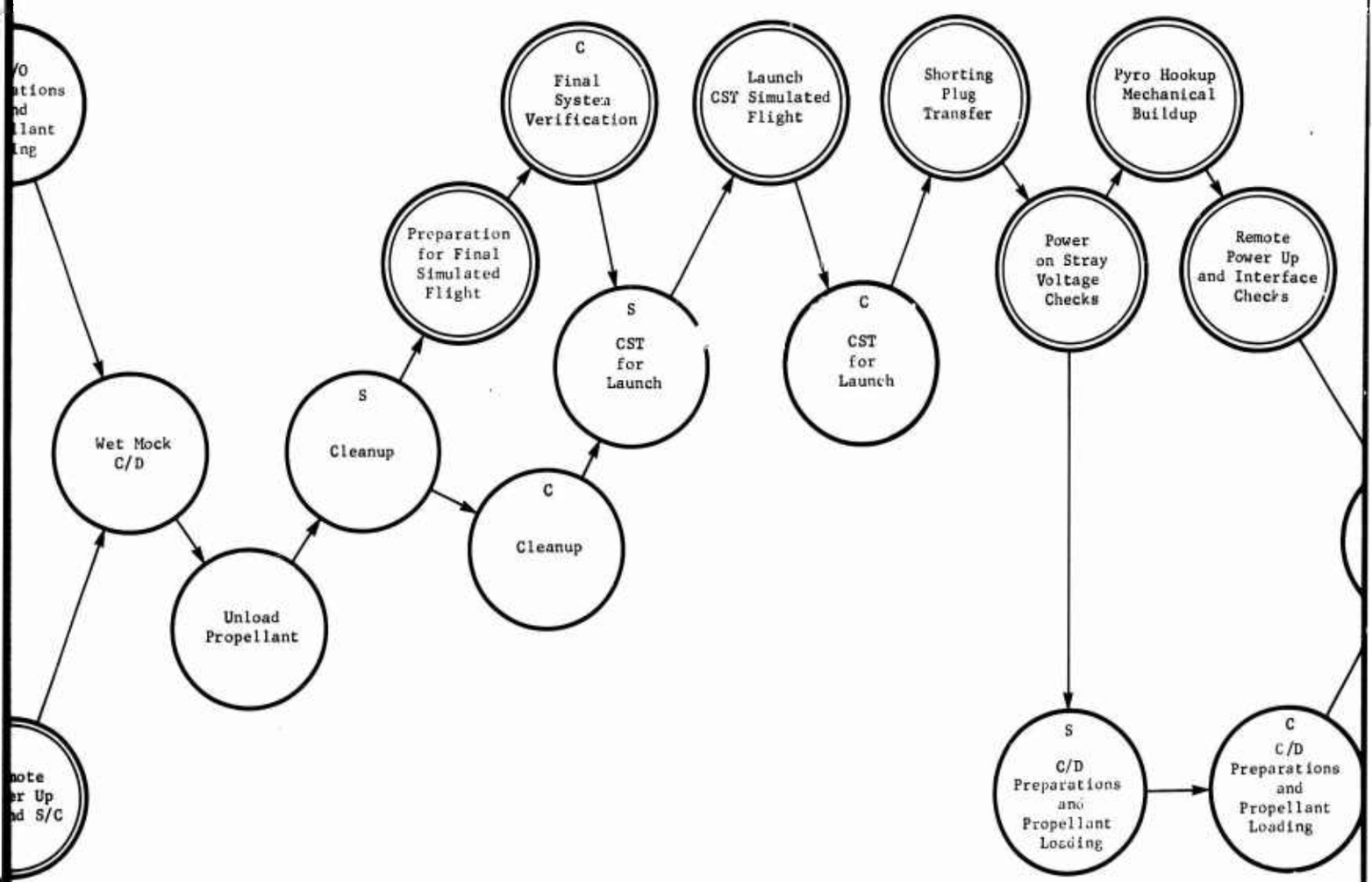
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Launch CST Simulated Flight
C
CST for Launch
Shorting Plug Transfer
Power on Stray Voltage Checks
Pyro Hookup Mechanical Buildup
Remote Power Up and Interface Checks
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Fig. V-6 MOL

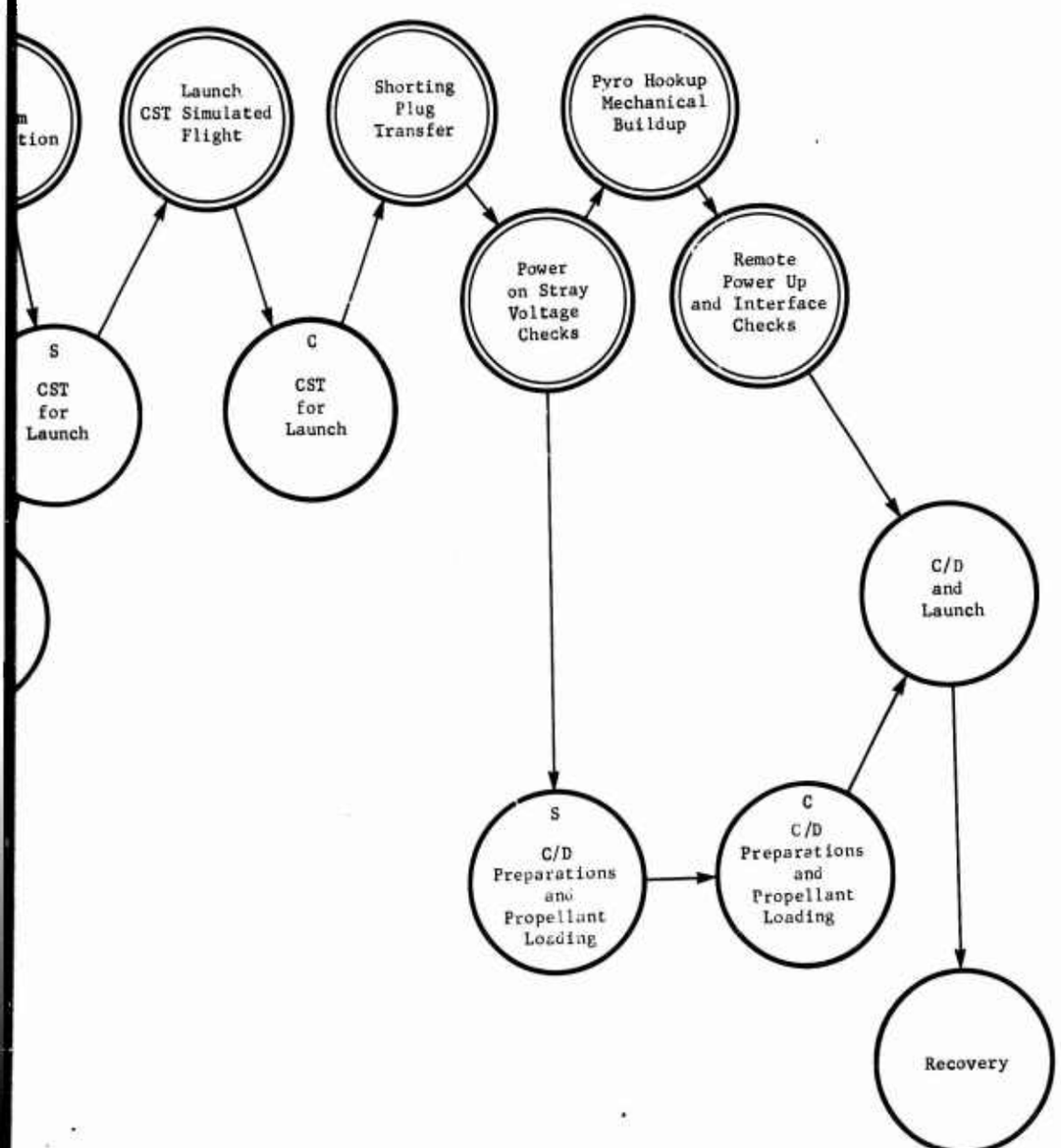

Fig. V-t MOL-HSQ ETR Flow Plan

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The launch complex integration contractor is responsible for overall management and implementation of site activations under Air Force direction. Activation covers that effort necessary to accomplish the engineering, surveillance, construction and/or modifications of facilities, the installation and/or modification of AGE and GIE, and the checkout and acceptance of the MOL-HSQ systems. Since SSLV booster system procedures and sequences have been established during the Titan III launch operational phase, the significant task encompasses the integration of the payload (Simulated Lab and Spacecraft) into this established system.

1. Facility Construction

Military construction and modification and facilities will be the responsibility of SSD through the Army Corps of Engineers. Martin will provide surveillance of construction with both the construction contractor and construction agency as set forth in SSD Exhibit 62-130, and Martin's procedures will be consistent with procedures described in SSD-CR-63-15, Facilities Construction Surveillance Plan - AMR, except that data submittals will be in accordance with DRD DSCNP-EF (Rev 1), dated 3 May 1965.

2. Installation and Checkout (I&C)

Planning and implementation of the AMR activation will be performed to meet the requirements of the MOL-HSQ system in accordance with MOL-EFT-AGE-4100, Rev 1, Aerospace Ground Equipment Specification; SSS-TIII-010 GIE, Addendum 1; SSS-TIII-010,OGE Addendum 1; MOL-EFT-ICS-5100, Installation and Checkout Specification for MOL-EFT AGE.

The Martin Company will be responsible for preparation, release, and implementation of the subcontractor statements of work encompassing the installation of mechanical, electrical, and structural AGE systems that are the responsibility of the system integration contractor. These statements of work will delineate the subcontractor's scope of work, installation, specifications, and material requirements (i.e., Class I hardware and hardware that is normally furnished by the subcontractor, excluding major items of equipment), and quality requirements, work schedules, test schedules, and the applicable documents and drawings.

Spacecraft AGE will also be installed, but under a separate contractual coverage.

During the installation period, the system integration contractor will provide engineering liaison and will coordinate associate and subcontractors to arbitrate and authorize necessary deviations and material substitution, and to interpret engineering requirements for the subcontractor.

3. Ground System Test Procedures (GSTPs)

Martin will prepare and implement GSTPs/TPs as required to verify the installed MOL-HSQ AGE systems and modified Titan III AGE systems. Such verification will be only on the requirements imposed by contract specifications and only for that part of the system specifically installed or modified for the MOL-HSQ program. Martin will write and conduct those GSTPs/TPs required on the Gemini AGE that it installs (such as propellant plumbing, electrical cabling, gas systems, etc). MAC will prepare and conduct those tests equivalent to Martin GSTPs/TPs required for the Gemini AGE (such as checkout consoles, propellant loading systems, etc). During these checkouts MAC will be responsive to Martin (as integrating contractor). In accordance with the general procedures, such procedures will be detailed in the Joint Operating Agreements.

4. Receipt-to-Launch Sequence

No item listed herein will have precedence over Titan III launch program requirements and practices.

Test Preparations - The following systems will be functionally verified, and calibrations will be performed in the VIB to ensure a state of readiness for checkout of the core vehicle and Simulated Laboratory:

1) Cell 1 platforms;

2) Missile-handling equipment;

3) Transporter 1;

4) Ground power supply conversion and distribution systems;

5) Pressurization systems, calibration and verification;

6) Diesel locomotives and undercarriage assemblies (in maintenance area);

7) Mobile equipment van sets, placement, connection, and checkout;

8) IGS environmental and air conditioning systems, vehicle/vans;

9) Control center calibrations and functional verifications.

Vehicle Erection - The three stages of the Titan III standard core vehicle and the Simulated Laboratory will arrive at the ETR skid strip aboard Air Force C-133 aircraft. The vehicle stages will be transported to the VIB low-bay areas, where a normal receiving inspection will be performed with the stages horizontal. Vehicle integrity verifications will be performed, and the bridge crane will be used to erect, position, and mechanically mate and align the vehicle stages sequentially on the transporter.

Power On - The vehicle will then be electrically mated with the electrical umbilical disconnects and the SRM simulator and continuity established through the mobile vans to the VIB power distribution system, and airborne electrical power applied to the vehicle.

Subsystem Test - This phase consists of installation of all core vehicle, airborne vehicle equipment except ordnance. Total functional verification of all airborne and ground support systems will be performed in conjunction with the solid rocket motor simulator. This checkout will demonstrate compatibility, patching continuity, remote-control capability, and complete operational readiness of the core vehicle.

CST Preps - CST preparations consist of the installation and system operation necessary to bring the core Laboratory and ground support systems into readiness to support a combined systems test, monitor system functions, and evaluate test data. Solid rocket motor and Gemini functions are simulated. The combined system test simulator set (CSTSS) cabling will be installed to simulate launch.

CST - The combined systems test performed in the VIB will demonstrate the core/Laboratory integration and AGE compatibility. This integrated test will consist of a countdown and countup through issuance of all discretes from the inertial guidance system. Ordnance firing and battery activation are simulated, and instrumentation and range safety equipment are in operation.

Transport VIB to SMAB - The mobile van interfaces will be disconnected from the VIB, undercarriage assemblies moved under the transporter, and the vehicle/transporter/van combination will be moved with diesel locomotives to the SMAB for solid motor installation.

SRM Core Mate - The solid rocket motors, having been assembled and tested before arrival of the transporter, will be lifted by a 300-ton SMAB overhead crane and mechanically installed on the transporter frame. The core vehicle supports will be removed and core vehicle attached to the SRMs. UTC/Martin will then mate the electrical interfaces. No power will be applied to the vehicle in the SMAB.

Transport SMAB to P-40 - At this point, the Titan IIIC standard space launch vehicle is completely assembled. The transporter containing the full configuration, minus Gemini payload, will then be transported to the Complex P-40 launch area. The transporter will be set on the launch pad piers, secured, and the undercarriage removed. The mobile service tower will be moved in place around the vehicle and platforms extended.

Subsystem Functional Verification P-40 - The time span allocated for the function does, in fact, include effort in addition to system verification. All launch-pad-peculiar subsystems will have been verified before the arrival of the vehicle. On its arrival at P-40, the Gemini Spacecraft, with its associated handling equipment, will be delivered to Martin by McDonnell. The Gemini Spacecraft will be hoisted by use of the MST crane and mechanically mated to the vehicle. The Spacecraft enclosure will then be secured around the Spacecraft. After installation of the payload, the payload contractor will perform a functional verification of all Spacecraft systems. Martin will connect the mobile vans to the AGE interface at the complex and reverify the functional performance of all subsystems. All this will require close scheduling coordination because of the many functions to be conducted concurrently. This period of effort will culminate in an integration of all associate systems into the SSLV as demonstrated by a baseline combined systems test.

EMC Testing - Upon successful completion of the baseline CST, EMC test equipment will be installed on the vehicle and a combined demonstration will be performed to ensure that all systems are RF compatible. A detailed, integrated EMC test plan will be prepared by the Martin Company before the EMC test is run.

CST for Wet Mock - When the EMC test is successfully demonstrated, EMC test equipment will be replaced by the standard ordnance circuit simulators and checkout cabling will be installed. A CST will then be performed to indicate an operational ready status for a wet mock countdown.

Checkout Preps and Propellant Loading for Wet Mock - All systems will be configured and verified to a flight status and propellants will be physically loaded on the vehicle and Spacecraft as a coordination exercise for all contractors. Limited access will be in effect during the loading operations.

Wet Mock Countdown - The wet mock countdown is a real-time full dress rehearsal of the launch countdown including flight simulation and recovery sequence. The only exception to an actual launch is in the area of ordnance systems which may or may not be physically installed or connected and will not be activated. All ETR range support will participate in this exercise with the contractors.

Unload Propellants - Upon completion of the wet mock countdown, propellants will be unloaded and the propellant systems purged and secured.

Cleanup - Postfire procedures will be performed as applicable and all vehicle systems secured to a ready operational condition. General housekeeping will be stressed.

CST for Launch - Launch CST is the official launch readiness demonstration of total vehicle payload and AGE system compatibility. This integrated system test will consist of a countdown and countup through the issuance of all discretes from IGS. Ordnance firing and battery activation are simulated, and instrumentation and range safety equipment are in operation. Upon completion of the launch CST, an integrity system check is implemented which consists of sealing of all AGE racks. At this point, access to the vehicle is allowed only through the permission of the test conductor.

Countdown Preps and Propellant Loading - Subsystems are verified to a launch configuration, ordnance is installed, propellants are loaded, and the vehicle is pressurized. Integrity checks are conducted and ground systems secured for launch.

Launch - All contractors and range support functions for launch are integrated into the Martin Launch Countdown Procedure OFO2, which is performed under the direction of the test conductor.

Test procedures for receipt, erection, checkout, and launch will be prepared by the Martin Canaveral Division and circulated through the existing Titan III approval system. The procedures that are MOL-peculiar will be identified "H" or "special test" procedures to minimize impact to the normal Titan III program test operations.

All procedural interfaces between Martin and MAC will be documented in the Joint Operating Agreement.

5. Data Analysis and Flight Reports

The results of the prelaunch and flight activities conducted at P-40 will be evaluated twice, both times in close conjunction with Titan III. The first review of data will be conducted at the launch site within hours after the launch. An immediate cursory review of available real-time and local playback data is made to evaluate achievement of test objectives, and to point out obvious performance anomalies for immediate investigation.

The second review will be held at Martin shortly after receipt of all range data. During this period, specialists will examine every available data parameter. The review will establish the basis for the final flight report, as well as direct the initiation of any further design or test activities.

After receipt of all range and Gemini data at Denver, a final flight report will be submitted that contains:

1) Determination of whether the objectives were accomplished;

2) A detailed analysis, by subsystem, of test performance;

3) Failure identification and analysis and recommendations for corrective actions.

E. SPARES SUPPORT AND MAINTENANCE

In conjunction with the design engineer, the maintenance/spares analyst will assure that proper spares are identified on the Class III drawings. The support already provisioned for the Titan III launch vehicle may be common to the support required by MOL-HSQ equipment. All spares identified on Class III drawings will be accumulated on a Test Support Table (TST) (see Data Item L-10-28.0 AFSCM/AFLCM 310-1B for format, minimum data elements columns 1, 4, 5, and 7). The TST is intended to provide Maintenance and Supply personnel with a list of spares to be furnished. Supply Item Management (SIM) is responsible for all spares aft of Station 77.0. With the TST proper assignment of all spares can be ensured. The TST will serve as a central document for monitoring receipt and issuance of spares at the test site, and will serve as a central document for material status to track procurement and for Production Control to track manufacturing.

Spares will be manufactured or procured as a result of requirements cited on the Class III drawings. They will be inspected in accordance with requirements cited on those drawings.

The maintenance/spares analyst will make a record of unusual maintenance requirements and will review all data to detect the impact on reliability or maintainability of design. Significant maintenance actions will be included in the program final report.

F. FINAL REPORT

Martin will prepare and submit a final report summarizing the events, results, significant technical findings, conclusions and recommendations from the MOL-HSQ program. Acceptance of this report by the Contracting Officer shall constitute completion of all HSQ program efforts required by contract.

APPENDIX

WEIGHT AND MASS PROPERTIES CONTROL PLAN

A. INTRODUCTION

The mass properties of the MOL-HSQ Simulated Laboratory, including the McDonnell Spacecraft and adapter, have been established by the MOL-EFT-AVE-1000 specification. The total weight of these components has been established at 20,200 $\pm$ 200 lb. Likewise, the center of gravity and the moment of inertia about the pitch, yaw, and roll axes are established as follows:

Center of gravity = Station -192.0 $\pm$ 6 in.;

Roll moment of inertia = 10,500 $\pm$ 10% slug-ft^2;

Pitch and yaw moment of inertia = 114,000 $\pm$ 10% slug-ft^2.

Contributing to the total weight of 20,200 lb for the MOL-HSQ vehicle are 6405 lb for the Gemini HSQ (including the adapter) plus approximately 4900 lb for the Simulated Laboratory. This leaves approximately 8900 lb to be supplied by ballast to meet the total gross weight requirement.

No weight-control program will be implemented for control of the vehicle's hardware weight. Instead, weights of vehicle components will be monitored on an after-the-fact basis, and ballast weight and location will be varied to meet specification requirements.

B. REQUIREMENTS

Preliminary MOL studies conducted during the preprogram phase by Martin, McDonnell, and SSD/Aerospace have established first approximations of final configurations and weights. Based on these data, tentative weights and mass property data for the Simulated Laboratory and the Gemini have been agreed to by all organizations. A significant portion of the Simulated Laboratory weight for this program will be ballast, and as a result the problem of weight control is more a problem of monitoring design to adjust the ballast as opposed to a serious control activity.

C. WEIGHT CONTROL

The MOL-HSQ statement of work suggests that conservative design practices will be employed to assure the structural integrity of the Simulated Laboratory. As a result, the weights analyst assigned to the program will be responsible for calculation of basic structure and installed item weights on an after-the-fact basis relative to design. All calculated and actual weight data will be manually recorded. Actual installed equipment will be weighed, primarily to verify mass property influences.

D. MASS PROPERTIES

Since the desired mass properties of the Simulated Laboratory have already been established, it will be the responsibility of the project weights analyst to maintain a record of the Laboratory inherent mass properties and a corollary record of required ballast adjustments to achieve the required conditions. These records will be manually maintained.

E. REPORTING

There is no contract requirement for formal periodic weight and mass property reporting for the MOL-HSQ program. Such data will be maintained by the contractor and made available to SSD/Aerospace upon request.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

PROGRAM PLAN

CHANGE NOTICE

NO. 2
DATE 17 February 1966

SPEC NO. SSD-CR-65-91
TITLE Program Plan Manned Orbiting Laboratory - Heat Shield Qualification (MOL-HSQ)
DATED October 1965
REVISION NO. DATED

PURPOSE OF CHANGE:

This change corrects an error in the Program Plan for Pad 40 construction complete which is shown as 15 April 1966, but is actually 15 May 1966. The 15 April 1966 date is BOD not construction complete.
(Incorporate PPCNP-B, Change No. 34-M40029)

INSTRUCTIONS:

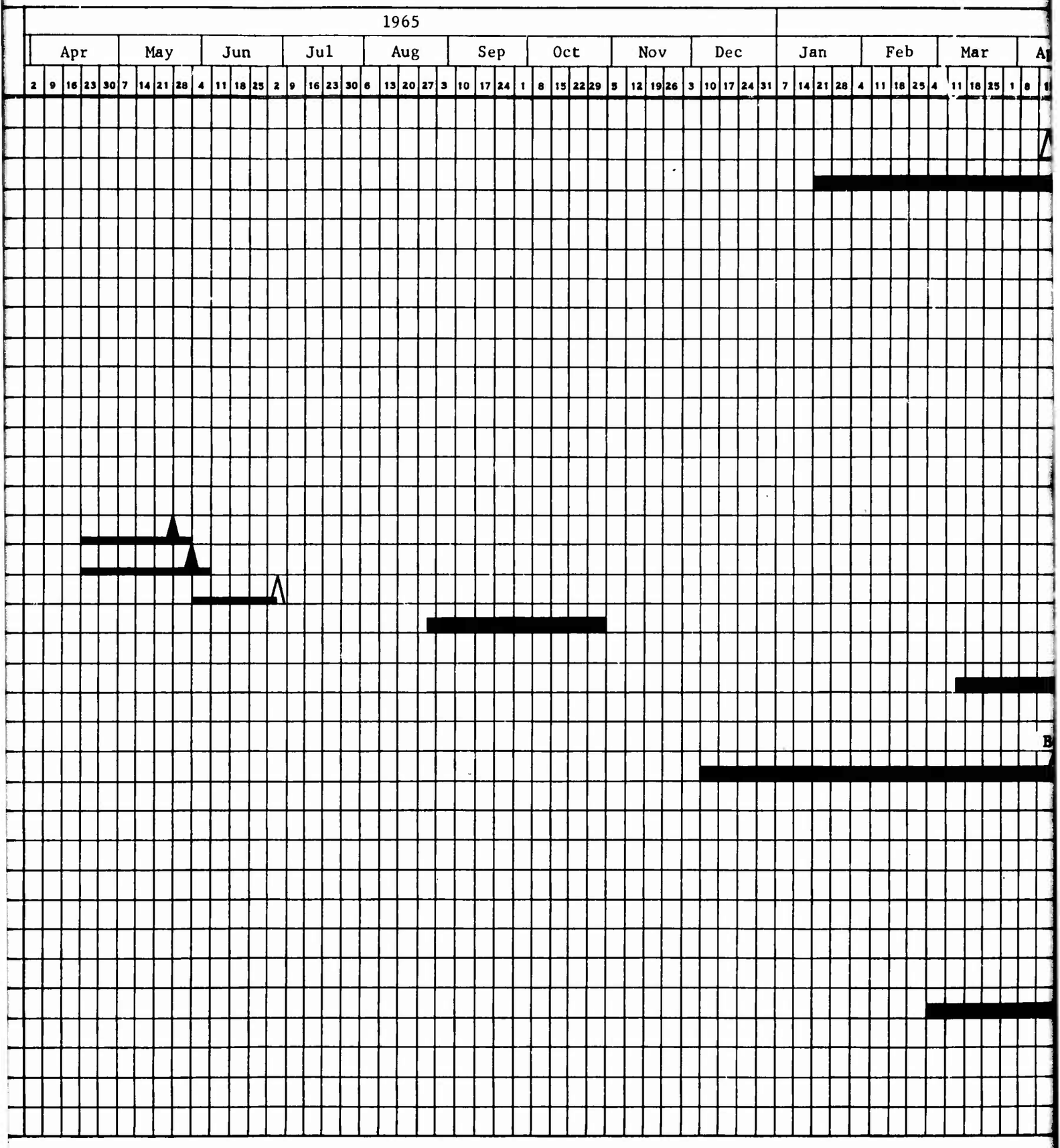
Replace page IV-11, IV-12 with new page IV-11, IV-12.

AUTHORIZATION: SCD No. P3-3452 dated 17 January 1966 (Martin Ref. 6WO1677) and Contracting Officers Letter dated 7 February 1966 (Martin Ref. 6WO2266)

File this page in front of subject document to indicate the latest change.

W. B. Wade Jr
APPROVAL

MOL-HSQ MASTER SCHEDULE, MAJOR TASKS	Apr					May				Jun				
	2	9	16	23	30	7	14	21	28	4	11	18	25	
VTF - Cell P-4														
Adapter Kits Available														
Acceptance Procedures Preparation														
Supports - Fabrication and Installation (Mfg)														
Cell Mod														
Test Operations - Lab and Transtage														
Cell Restoration														
Pack and Ship - Factory														
Laboratory, Transtage, and Handling Equipment														
Titan III - Stages I and II														
ETR - Activation and Launch														
Facility Criteria - Denver Engineering														
- VIB Preliminary to SSD/A and Review														
- P-40 Preliminary to SSD/A and Review														
- Final to SSD/A														
A&E Design														
LCC and TRAN - Installations														
- GSTPs/TPs														
- Operations (SLV-9)														
Pad 40 - Construction														
- Installations														
- Complex Checkout														
- Operations (SLV-9)														
MAC - Gemini Spacecraft to P-40														
MAC - Martin AGE Deliveries to ETR														
- Fixed AGE														
- Mobile AGE														
Final Report														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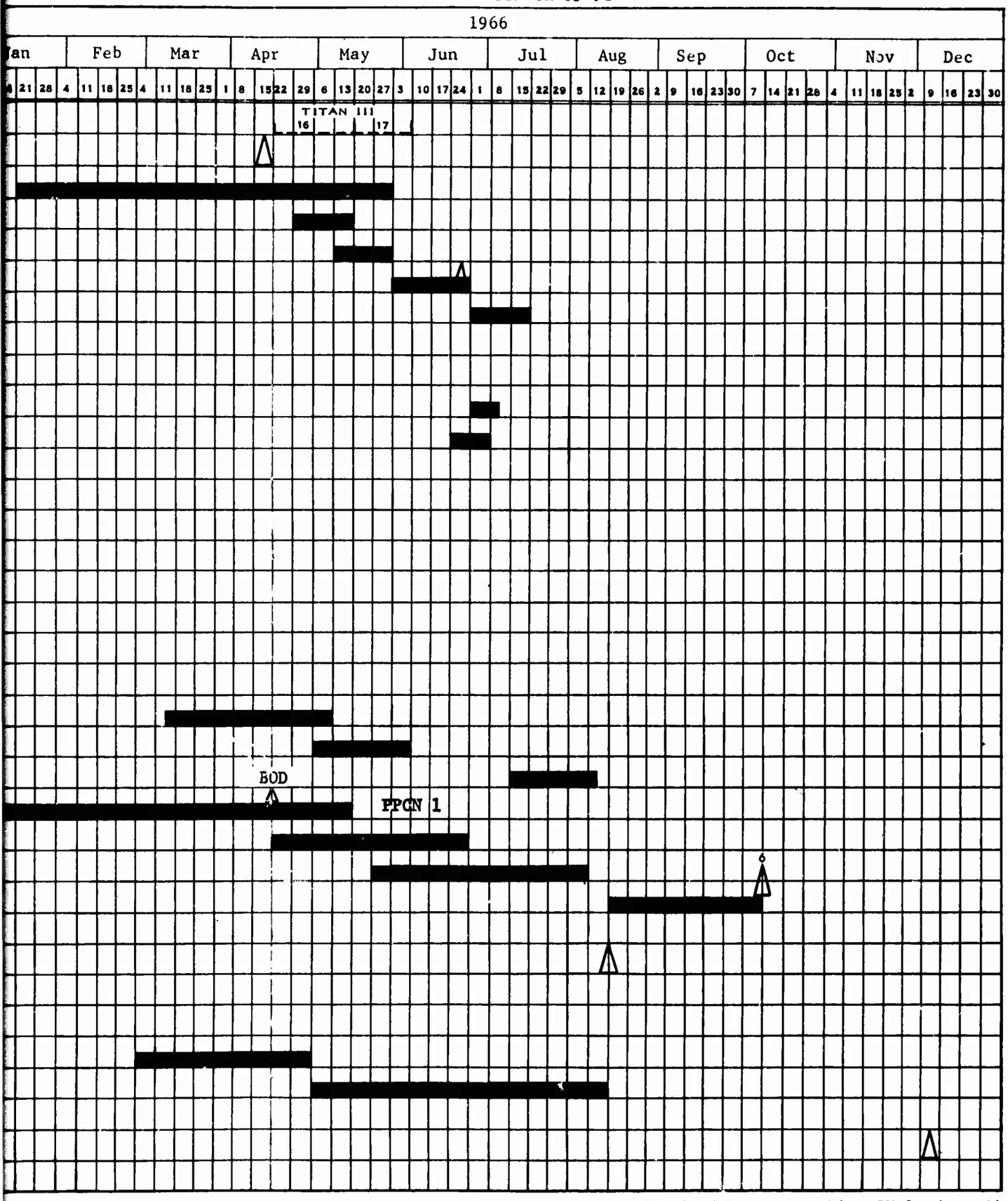

Revised 10/20/65 Fig. IV-3 (concl)

* This page supersedes and replaces Page IV-11, IV-12 and incorporates PPCN 2, dated 17 February 1966.

SUPPLEMENTARY

INFORMATION

MARTIN COMPANY
DENVER DIVISION

CONTRACT NO. AF04(695)-150

PROGRAM PLAN **CHANGE NOTICE**

NO. 3
DATE 20 May 1966

SPEC NO. SSD-CR-65-91
TITLE PROGRAM PLAN MANNED ORBITING LABORATORY-HEAT SHIELD QUALIFICATION (MOL-HSQ)
DATED October 1965
REVISION NO. DATED

PURPOSE OF CHANGE: To update Sections I, IV and V in accordance with Martin Change 34-M40042, PPCNP-C.

INSTRUCTIONS: Replace pages I-3, IV-15, IV-17, V-19, V-21 and V-22, V-23 and V-24, V-25, V-26, V-27, V-28 and V-29 with revised pages I-3, IV-15, IV-17, V-19, V-21 and V-22, V-23 and V-24, V-25, V-26, V-27, V-28 and V-29. Pages IV-16, IV-18, and IV-20.

AUTHORIZATION: SCD P3-3624, dated 12 April 1966 (Martin Ref: 6-W-05566)
CCN 1657, dated 19 April 1966 (Martin Ref: 6-W-06470)

File this page in front of subject document to indicate the latest change.

APPROVAL

FORM DEN 1016-01(11-63)

- McDonnell Aircraft Corporation (MAC) under NASA and Air Force contracts has responsibility for all hardware and services associated with the Gemini Spacecraft and Gemini-peculiar AGE;

- Daniel, Mann, Johnson and Mendenhall (DMJM) has general architect/engineer responsibilities for ITL facility modifications, which include supporting Martin in preparing the Contract End Item Specification for ITL facility modifications.

This program Plan outlines, in general terms, the overall aspects of the MOL-HSQ program, including the major actions and responsibilities of all associate contractors. The plan presents, in detail, the technical and management approaches to be used by the Martin Company in accomplishing the program objectives. The plan includes provisions for working interface problems and program schedules and controls in all areas of Martin responsibility.

(PPCN 3) Except for the sections listed below, this Program Plan is not a delineation of contractual requirements, but a plan for their accomplishment and therefore will not be updated or maintained. To the extent that plans other than those listed below are not contractual requirements of this program, Martin reserves the right to deviate, if required, from the plans, without specific approval from the government.

The following sections in this document will be formally maintained:

IV-B	Model Shop Practices
IV-D	Configuration Management Plan
V-C	Acceptance Test Plan

*This page supersedes and replaces page I-3 and incorporates PPCN 3, dated 20 May 1966.

- A manually maintained Master Log will provide total accountability for all released drawings and changes.

- When the Project Engineering and Manufacturing representatives have signed a basic drawing or Drawing Change Notice (DCN), MOL-HSQ release then makes an entry in the Master Log and releases the engineering for implementation.

- DCNs will be incorporated into the drawings at the convenience of the Project Engineer. The number of unincorporated DCNs will be minimal at time of shipment to ETR.

- Should a drawing be cancelled, the Master Log will show the cancellation, but shall maintain the record of the cancelled drawing and its DCNs.

(PPCN 3)

- For MOL-HSQ-peculiar equipment, only changes that require SCNPs or affect hardware or test after Inspection DD250 delivery will use the Uniform Control Number (UCN), the Job Unit Release Sheet

(PPCN-1)

(JURS), the Progress Ticket (PT), and the Change Operations Directive (COD). Before acceptance these releases will be posted on the Configuration Identification Index (CII) tab run only.

2) Manufacturing indicates the proper buy requirements to Procurement, and schedules the implementation of the engineering.

3) Quality performs inspections based on the engineering requirements listed in the Master Log and prepares the necessary Quality Log books showing work acceptance -

(PPCN 3)

- At time of acceptance Quality will assemble all required documentation, assure accountability of all released engineering, prepare a Inspection DD250, and present this and the hardware for acceptance by AFPRO per AFPRO procedures.

(PPCN 3)

4) After Inspection DD250, acceptance of engineering releases will be accomplished as follows -

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*This page supersedes and replaces page IV-15 and incorporates PPCN 3, dated 20 May 1966.

- When the need for a change is recognized, the engineer will define the total change requirement in PT increments.
- On release of COD approval, Engineering may release the PTs.
- These releases shall be posted on the CII tab run and on the retrofit tab run.
- When ETR or Denver obtains the retrofit tab run requirement, the COD, and the necessary kit, the change is installed and closed out using the retrofit tab run system. The engineering Master Log will reflect the retrofit tab run closeouts.

5) A complete set of as-built drawings shall be submitted at the completion of this program.

(PPCN-1) 6) All changes to MOL-HSQ-peculiar hardware that affect the governing contractual specification will be submitted to SSD as an SCNP to the applicable MOL-HSQ hardware specification in accordance with standard Titan III procedures.

(PPCN-1) 7) All MOL-HSQ-peculiar hardware and changes thereto are nondeliverable.

3. Modifications of Titan III CEIs to Support MOL-HSQ

Due to the limited use of the modification to a Titan III CEI, a new drawing designator (808D series) was created. With this drawing designator, the modification can be precisely identified and then removed at program completion.

(PPCN-1) All modifications of Titan III CEIs will meet standard Titan III procedures unless otherwise specified in this Configuration Management Plan.

1) An 808D series top drawing will be established for each Titan III CEI to be modified to show -

- The method of installing, testing, and identifying the modification.
- The method of removing the modification, retesting, and reidentifying the Titan III CEI.

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*This page incorporates PPCN 1.

2) In accordance with SSD-CR-63-11 (Rev 1), and as the master schedule requires, a COD will be prepared for each basic engineering release and each subsequent change.

3) The DD Form 829-1 will be updated to record the modification by UCN, its purpose, and the new CEI part number. It will be updated again when the modification is removed.

4) The Titan III CEI serial number will not be changed as a result of these modifications.

(PPCN-1) 5) Airborne vehicle equipment modifications will be expended, therefore no removal of modifications is possible or required.

6) None of the 808D series of drawings will appear in the Titan III CEI engineering drawings or drawing indentures.

(PPCN-3) 7) Inspection DD250 acceptance of a modification will take place at the completion of the installation and testing of the modification.

(PPCN-1) 8) All modifications to Titan III CEIs will be nondeliverable.

(PPCN-1) 4. Specifications

(PPCN-1) 1) MOL-HSQ-peculiar hardware is defined in MOL-HSQ Research and Development Specifications. Changes to MOL-HSQ-peculiar hardware specifications shall be processed in accordance with Para 2.6).

(PPCN-1) 2) MOL-HSQ modifications to Titan III AVE and AGE have been defined in addenda to Titan III R&D Specifications and approved at contract go-ahead. Future changes to Titan III hardware after baseline will require EPCs in accordance with standard Titan III change procedures and an SCNP to update the MOL-HSQ addenda to Titan III AVE or AGE.

(PPCN-1) 3) An addendum to the Titan III AMR I&C Specification will define the Martin Company-supplied new installations required for the MOL-HSQ program.

*This page supersedes and replaces page IV-17 and incorporates PPCN 3, dated 20 May 1966.

PPCN-1 4) A MOL-HSQ Installation and Checkout Specification will define the I&C requirements for MAC supplied AGE. Class I changes to these requirements will be controlled by SCNP action to the I&C Specification.

PPCN-1 5) Research and Development specifications maintenance will be accomplished in accordance with SSD-CR-63-11, Rev 1, Para 5.4.1 through and including 5.4.1.4.

PPCN-1 6) Interface specification preparation and maintenance will be accomplished in accordance with Appendix B to IFD-TIII-00001, Rev 1.

5. Definitions

PPCN-1 1) Deleted.

PPCN-1 2) Deleted.

3) The Uniform Control Number (UCN) is a number assigned to Class I and Class II Critical Engineering Design Change Schedules. Further, the UCN is used to identify all documents associated with implementing that change.

4) Progress Ticket (PT) is an incremental breakdown within engineering to provide the capability of partial UCN release.

5) Job Unit Release Sheet (JURS) is used to collect and list all drawing(s) and DCN(s) for one PT.

E. TECHNICAL MANAGEMENT

1. Engineering

All engineering required to fulfill Martin Company's responsibilities on this program is under the cognizance of a single MOL-HSQ Project Engineer. This program contains a threefold responsibility: Simulated Laboratory, Titan III modifications, and technical integration. Engineering effort in all three areas is directed and controlled by the MOL-HSQ Project Engineer using engineering directives, engineering schedules, engineering time and cost reports, and direct personal supervision.

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*This page incorporates PPCN 1.

The Simulated Laboratory will be placed on an erection dolly (Fig. V-3) and sent to VTF for engineering structure test. Manufacturing will assist Engineering in the static test effort.

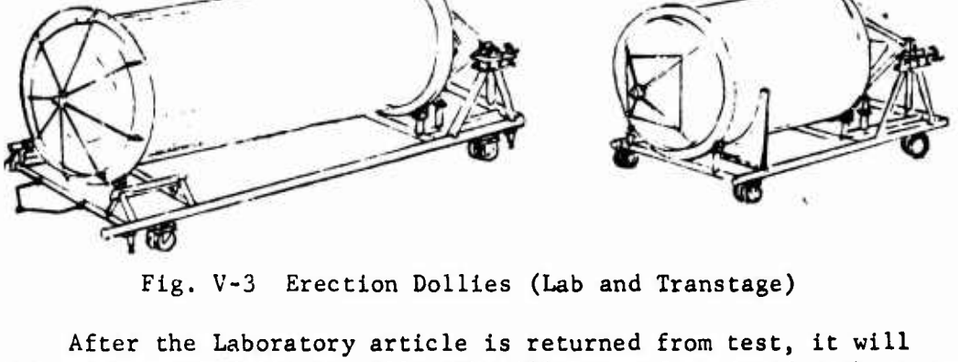

Fig. V-3 Erection Dollies (Lab and Transtage)

After the Laboratory article is returned from test, it will be put on work dollies. All work will be performed under the surveillance of Quality Control. The wiring, harnesses, instrumentation, and antennas will be installed on the Laboratory article, and the truss will be installed on the skirt frame. Doors will be bolted to the skirt, and the cover installed on the forward dome. Quality will inspect and record the operation log plans. A point-to-point continuity and megger check will be performed of the electrical and instrumentation harness. The laboratory article is then put on an erection dolly and sent to VTF for acceptance check.

Certain modifications are required to the Titan III SLV-9 Transtage for the MOL-HSQ flight. At present, these changes only involve mounting new connectors at Station 77 and wiring them to the Transtage's umbilical connector. These changes will provide ground power and remote telemetry system control for the Simulated Laboratory. Following installation, continuity and megger tests, and Quality inspection, the Transtage will be moved to the VTF.

(PPCN 3) In the VTF the total Titan III Core Vehicle shall be erected in Cell P-4. The Laboratory article will be mated to the Transtage electrically by marriage cables. Quality Control will check interfaces and record the operation. The System Test and Support Department will perform acceptance check, and Quality Control will inspect and document all functions in preparation for Air Force acceptance of the completed payload. The assemblies are then removed from VTF and sent back to the factory for pack and ship.

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*This page supersedes and replaces page V-19 and incorporates PPCN 3, dated 20 May 1966.

Before pack and ship the Simulated Laboratory will be weighed, cleaned, and painted, as required. All loose items such as ballast weights, batteries, etc, will be shipped separately. The Laboratory will be prepared for shipment and moved from the manufacturing dolly to a Stage II transtainer (Fig. V-4).

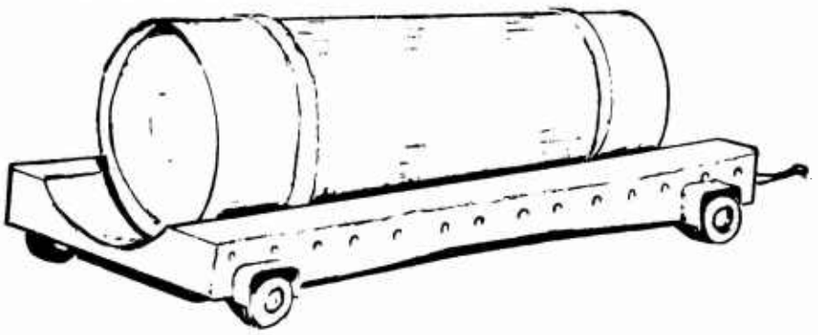

Fig. V-4 Laboratory on Stage II Transtainer

Ground equipment to support the program will be fabricated in the Manufacturing area using shop aids and layout as required to build platform adapters and hoisting equipment. The Electrical Group will fabricate and assemble into adapter kits the electrical equipment necessary to support the Simulated Laboratory. Quality Control will document the progress and test activity of all operations in accordance with the process logs and test procedures. Following acceptance of the various AGE items, they will be packed and shipped to ETR for installation.

C. ACCEPTANCE TEST PLAN

(PPCN 3) The MOL-HSQ Simulated Laboratory will be accepted at Martin-Denver by Inspection DD 250. The specific actions required to obtain this Inspection DD 250, together with the definition of the associated organizational responsibilities, are presented in this Acceptance Plan. A complete flow sequence for the laboratory testing is shown in Fig. V-5. This plan encompasses more than just the formal acceptance actions. It also defines the series of key steps to be taken before acceptance testing begins that will provide incremental agreement between all parties involved on the design and fabrication of airborne systems. These pre-acceptance actions are aimed at increasing assurance of vehicle quality and design compliance.

(PPCN 3) The overall program can be summarized in seven sequential steps: technical design reviews, incremental quality reviews, acceptance test plan approval, acceptance test procedures approval, acceptance testing, acceptance test results approval and issuance of an Inspection DD 250. Although the first two steps are not normally considered as part of acceptance procedures, they are basic to the MOL-HSQ acceptance philosophy. The formal acceptance test proves that operational subsystems function as specified. The design and quality reviews add assurance that all elements of the vehicle should function as required and that reliability has been maximized with program limitations.

MOL-HSQ design reviews fall into two categories: a formal design review and incremental informal reviews. The formal design review was completed on 24 September 1965 and all action items will be closed by 1 December 1965. This review was conducted by representatives of SSD and Aerospace from both the MOL and Titan III Program Offices. All subsystems were reviewed in detail from the standpoints of specification compliance and sound engineering practice. Successful completion of this review established approval of the Martin design and a baseline for future considerations. In addition, the Martin Company will conduct a number of informal but detailed reviews with SSD/Aerospace MOL Program Office personnel and also with review teams from Martin Engineering. These reviews will concentrate on considering all changes that occur in the baseline design. Acceptance of the system design provides the basic foundation for the acceptance of the article.

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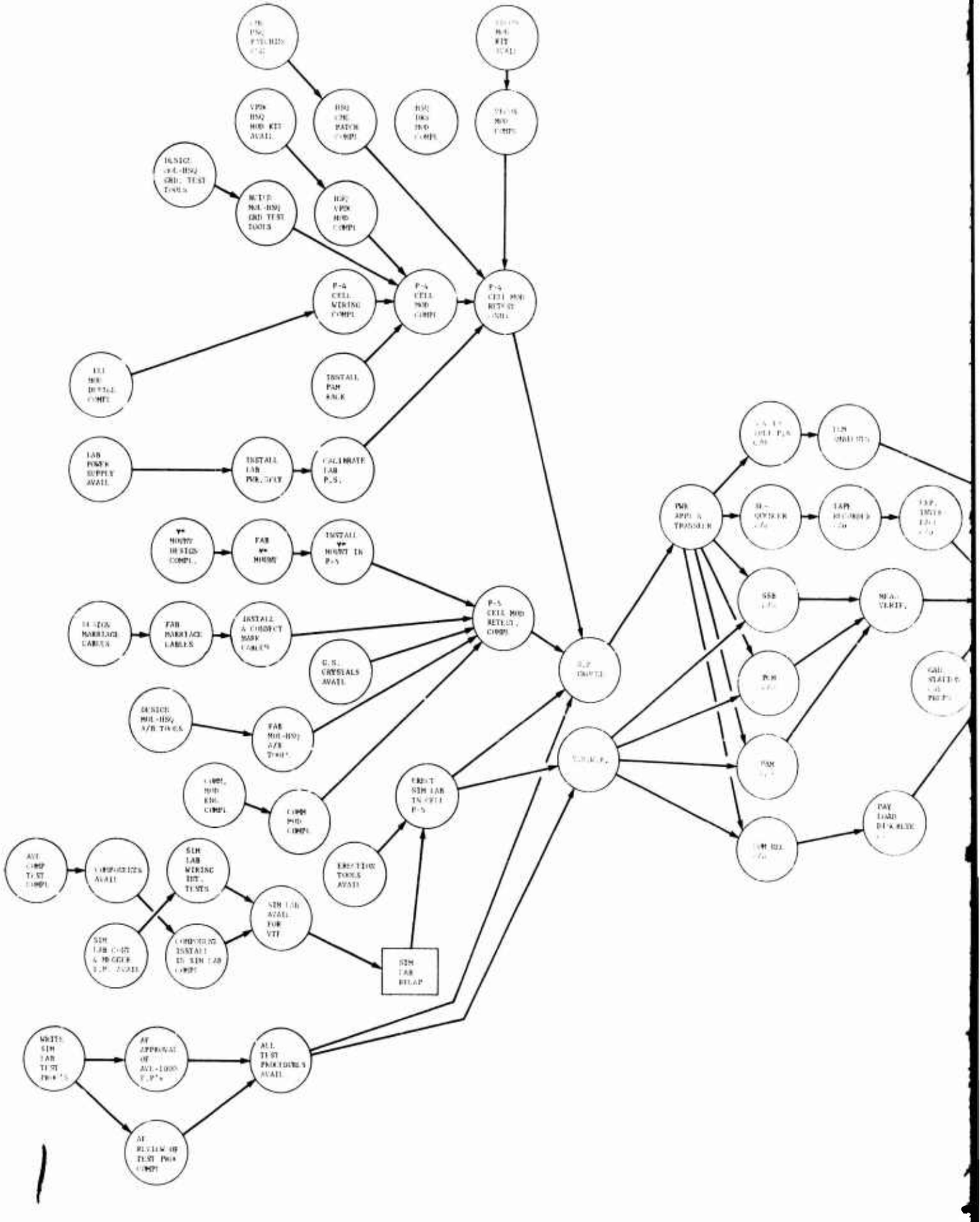
*This page supersedes and replaces page V-21 and V-22 and incorporates PPCN 3, dated 20 May 1966.



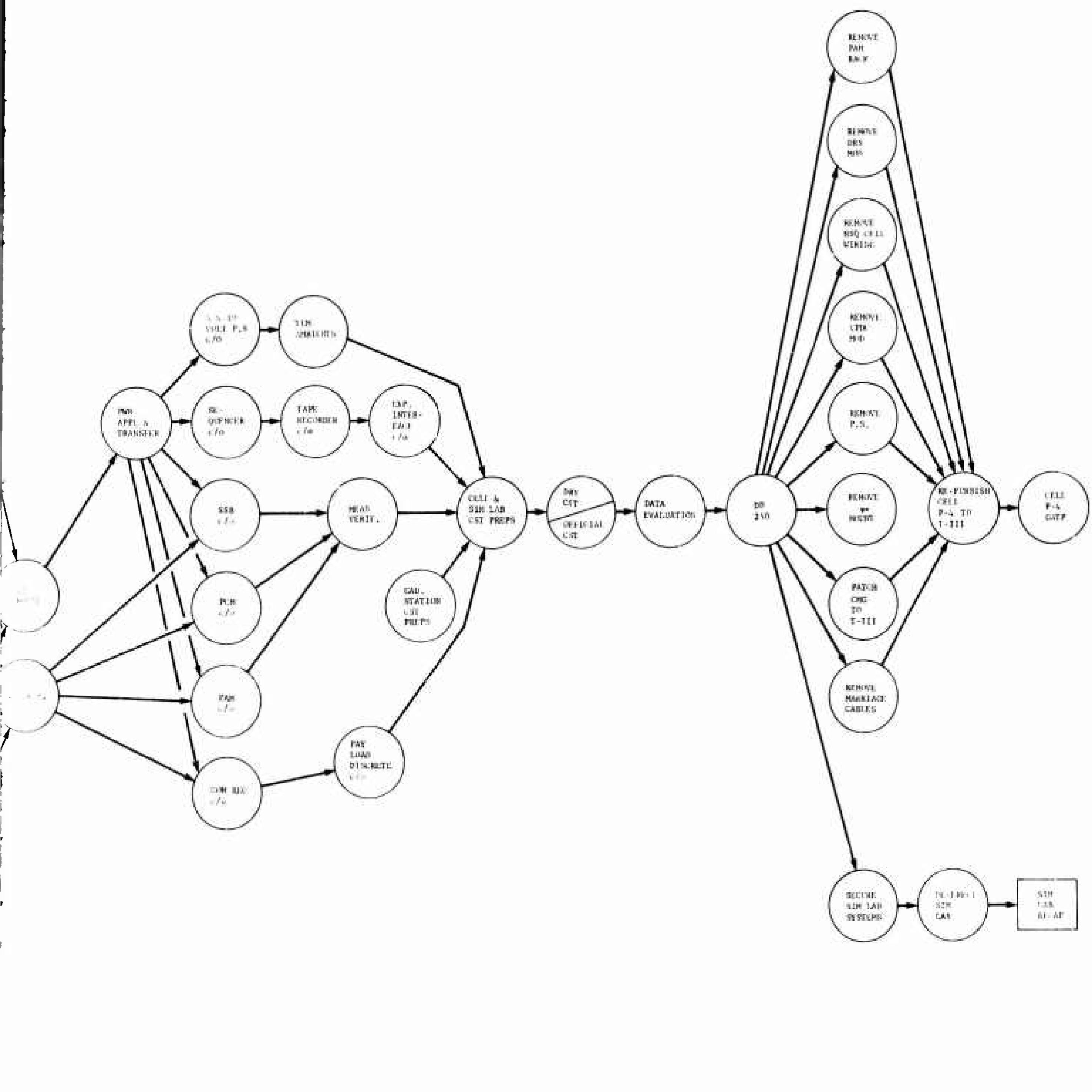


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Fig. V-5 [illegible] Vehicle Test Plan Flow Chart

*This page supersedes and replaces pages [illegible] dated 2 [illegible]

(PPCN 3) The next step is to ensure that the complete design has been faithfully converted into hardware. To accomplish this, a series of incremental quality reviews by Air Force Plant Representatives Office (AFPRO) personnel is planned. The relative simplicity of the Simulated Laboratory permit these reviews to be few and keyed to fabrication milestones. The review, in general, will be made at completion of the following milestones:

1) Forward Skirt Assembly at completion of build
2) Aft Skirt Assembly at completion of build
3) Tank Assembly at completion of build
4) Aft Skirt Area - prior to test (VTF)
5) Tank Assembly - prior to test (VTF)
6) Forward Skirt Area - prior to test (VTF)
7) Sub-system and Acceptance Test at VTF
8) Forward Skirt Area - prior to shipment
9) Aft Skirt Area - prior to shipment
10) Tank Assembly - prior to shipment
11) Records and Data - prior to shipment

These reviews then assure that the Laboratory has been built in compliance with the previously approved engineering design. The combination of design and quality reviews establishes the proper hardware baseline for the acceptance test.

(PPCN 3) Before test initiation, Acceptance Test Procedures will be prepared by the Martin Company defining every test to be conducted, the exact manner in which the test is to be accomplished, and the specific criteria for acceptability. Procedures will be submitted to SSD/Aerospace in AFPRO at least 30 days prior to start of testing. Approval of procedures is required 15 days prior to start of the Acceptance Tests.

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*This page supersedes and replaces page V-25 and incorporates PPCN 3, dated 20 May 1966.

(PPCN 3) All procedures which represent MOL-EFT AVE-1000 Specification acceptance requirements will be submitted to SSD/Aerospace, Martin Engineering and Martin Q.C. for approval, prior to release. Copies will also be sent to AFPRO for review and comment. Procedures in this category are:

PCN to 0C01-P4	Master Control-Vehicle Erection and Subsystem Test
PCN to 0D01-P4	Master Control Combined Systems Test
PCN to 6C01-P4	Electrical Single Point Ground and other resistance tests
PCN to 6C02-P4	Bus, Transfer, and IGS Impedance Tests
PCN to 2C09-P4	Vecos, Vehicle Subsystems Checkout
HSQ 4H10-P5	Lab Command System Functional Verification
HSQ-6H10-P5	Lab Electrical System Functional Verification
HSQ-7H10-P5	Lab Instrumentation System Functional Verification
HSQ-0M01-P5	Lab CST Data Document

(PPCN 3) Comments and suggestions will be negotiated and incorporated, as agreed upon. The procedures are then signed off and released for test.

(PPCN 3) Initial support type procedures (those procedures which do not collect MOL-EFT AVE-1000 acceptance requirements) will be submitted to Martin Engineering and Martin Q.C. for approval and to SSD/Aerospace and AFPRO for comment; but will not require Air Force approval.

(PPCN 3) VTF acceptance testing will be witnessed by AFQA. The AFQA will identify to the Contractor those tests which will require mandatory AFQA witness.

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*This page supersedes and replaces page V-26 and incorporates PPCN 3, dated 20 May 1966.

(PPCN 3) Procedure changes that occur after approval will be made by red-lining and initialling the changes by authorized personnel. Red-lined pages will be reproduced to provide an unalterable record. AFPRO approval of the final red-line version is required for all Acceptance Test Procedures. Excessive red-line changes will require that the procedure will be reproduced with the changes incorporated, and the procedure re-run. The final determination as to the extend of red-lining which constitutes excessive change will be at the discretion of the AFPRO.

(PPCN 3) MOL-HSQ peculiar changes (modifications) to the VTF cell and tool configuration will be performed by Discrepancy and Work Authorization Form (D&WA). D&WAs will require Martin Test and Martin Q.C. signatures for authorization. Martin Q.C. (VTF) will establish and maintain MOL-HSQ cell configuration records during the program. OGE/AGE changes will be directed by engineering releases and OGE/AGE changes will be directed by engineering releases and subject to the normal T-III procedures.

(PPCN 3) All VTF MOL-HSQ A/B test activity will be conducted under existing T-III practices. A/B configuration changes will be made in accordance with the configuration plan. Tests will be conducted in accordance with approved test procedures. Authorization to do work on the A/B article will be by D&WA requiring the same level of approval as prescribed by T-III regulations.

*This page supersedes and replaces page V-27 and incorporates PPCN 3, dated 20 May 1966.

In general both the Support and Acceptance Test Procedures are based on equivalent procedures employed on the Titan III program.

(PPCN 3) During the course of the acceptance tests, personnel from AFPRO will witness the conduct of the test. Although SSD and/or Aerospace personnel may observe the tests, action items will be processed only by AFPRO representative. Following completion of the tests, the Martin Company will prepare the MOL/HSQ Acceptance Team Data Package and provide these to the Air Force. This data package will contain:

1) Definition and identification of equipment to be accepted by model number (where applicable), nomenclature, part number, and serial and contract numbers.

2) Current approved model specification (MOL-EFT-AVE-1000).

3) Engineering drawings and the drawing master log.

4) Approved interface control documentation, where applicable.

5) Hardware shortages and associated make-up dates, listed on the quality recap.

6) A list of all approved Engineering Change Proposals (ECPs) and/or Class I changes.

7) Certification by the MOL-HSQ Program Implementation Manager that all facts and documentation described in 1 thru 12 are complete, accurate, and valid for the equipment being accepted.

8) A historical file of test data certifying the functional test results, complete with a record of functional deficiencies and corrective action taken, containing the following:

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*This page supersedes and replaces page V-28 and incorporates PPCN 3, dated 20 May 1966.

a) Certification of final test results (HSQ-0M01) and remaining functional tests required to demonstrate compliance with MOL-EFT-AVE-1000. These data will be in accordance with the acceptance test requirements and contain measurements taken during test.

b) A complete list of functional tests required by the specification, but not accomplished, listed on the quality recap sheets.

c) Certification in each test document stating that measurements made during the acceptance tests are within instrumentation accuracies required.

9) A summary listing of the measurements made during the acceptance test, the range, and accuracy of the instrumentation, and acceptable performance limits.

10) A copy of the verification and calibration of checkout and test equipment certified by the associate contractor and the AFPRO.

11) Calibration curves of test data for all transducers in the equipment undergoing acceptance test. The calibration shall be made on an end-to-end system basis whereever applicable.

12) MOL-HSQ historical laboratory log (hardware status).

13) Titan III transtage data due to MOL-EFT-AVE-1000 requirements.

(PPCN 3) An area will be provided for the Air Force (including Aerospace) acceptance team to conduct its review. There shall be a formal meeting prior to de-erection from VTF to consider outstanding design problems test problems and configuration of the MOL/HSQ simulated laboratory. When the results of the acceptance test are approved by the acceptance team, the AFPRO will issue the Inspection DD 250 formally accepting the Simulated Laboratory.

D. ACTIVATIONS AND LAUNCH OPERATIONS

The MOL-HSQ activation and launch operation efforts are implemented under an integration contractor-associate contractor relationship, with the Air Force (SSD) as the customer and overall manager. A flow sequence chart is shown in Fig. V-6, MOL-HSQ ETR flow plan.

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*This page supersedes and replaces page V-29 and V-30 and incorporates PPCN 3, dated 20 May 1966.